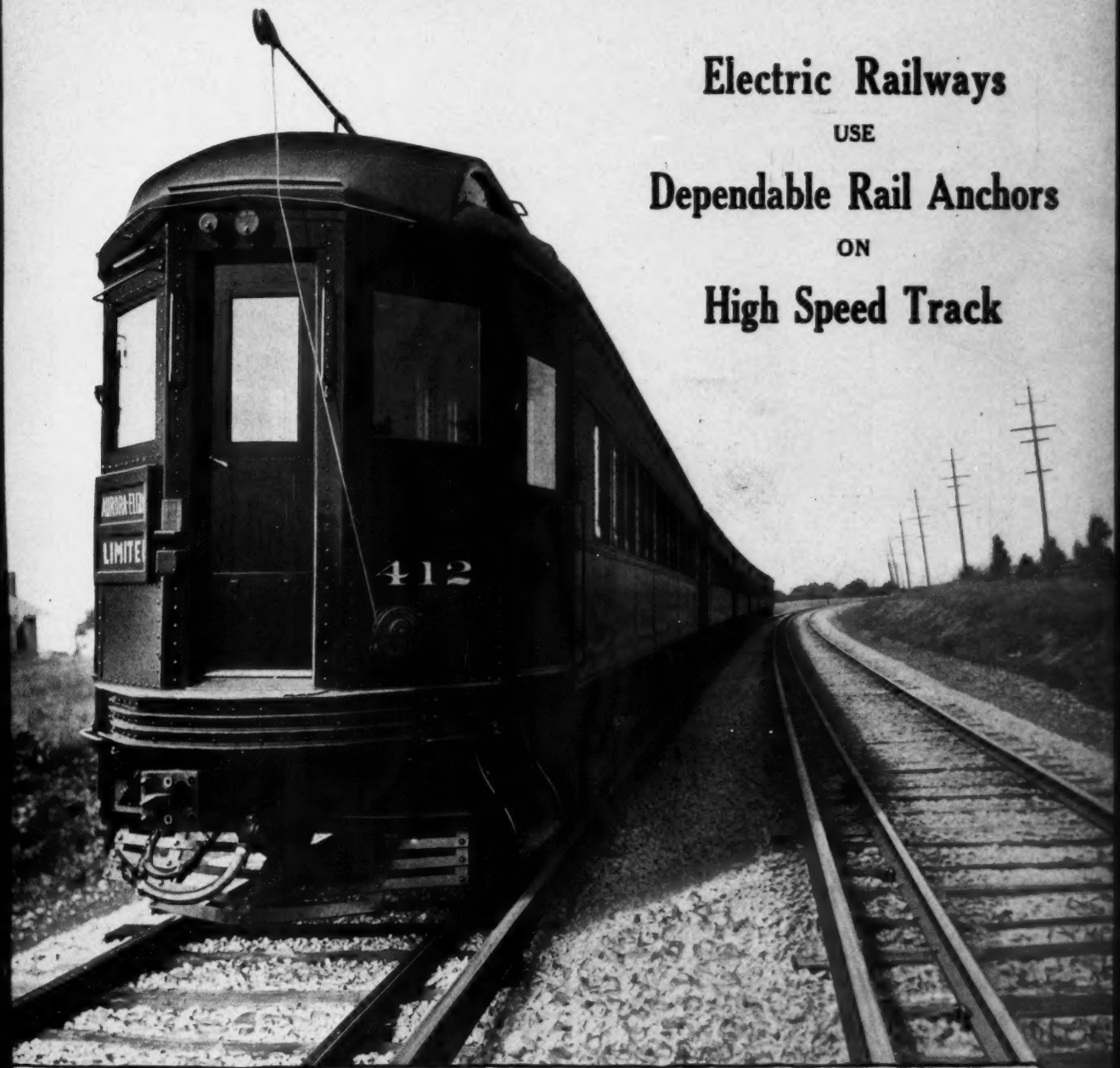
JANUARY, 1924

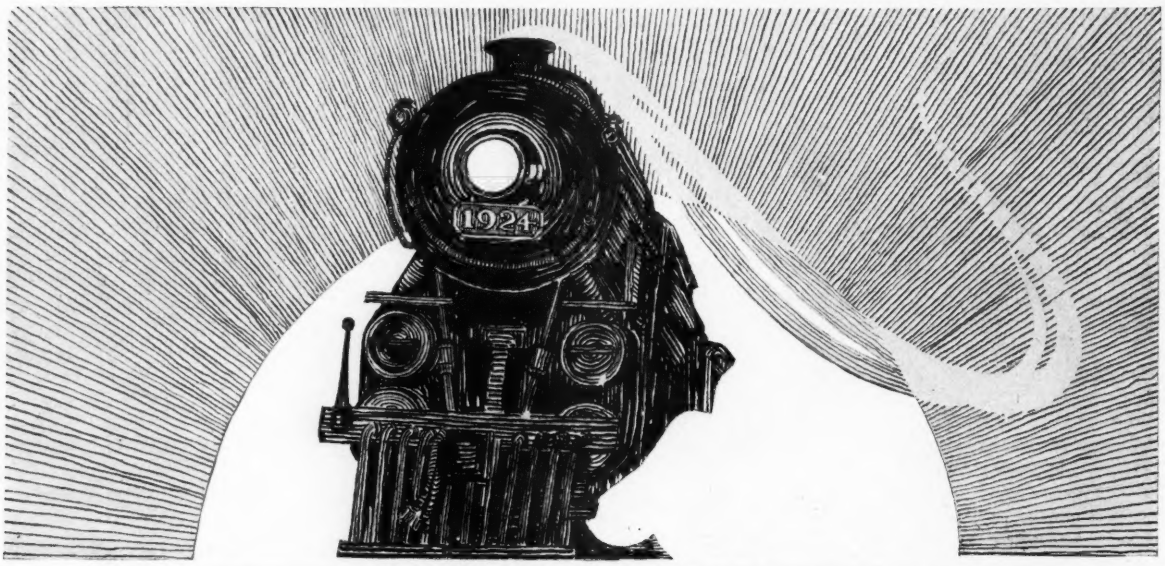
Railway Engineering and Maintenance



Electric Railways
USE
Dependable Rail Anchors
ON
High Speed Track

CHICAGO THE P. & M. CO. NEW YORK

MONTREAL LONDON PARIS CALCUTTA SYDNEY



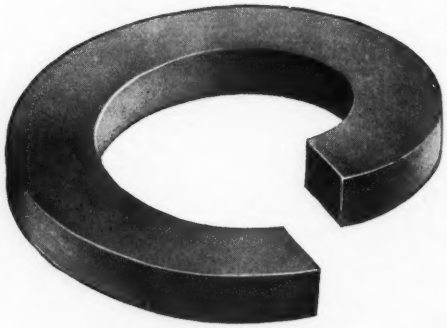
When Old Man Time Rolled In On 1924

ANOTHER YEAR of faithful service for many thousands of Hy-Crome Nut Locks was recorded on the railroads of this country and abroad. ¶ Many thousands more will begin their long vigil of safety with this New Year, for railroad executives are vizualizing more clearly than ever, that *it is not what you pay, but what you get* (in service) *for what you pay*, that determines true nut lock merit and value.

THE RELIANCE MFG. CO. · Massillon, Ohio

BRANCH OFFICES: New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco. DISTRIBUTORS: Crerar Adams Co., Chicago; Bostwick-Braun Co., Toledo; W. and A. C. Semple, Louisville, Ky.; Keith, Simmons Co., Nashville, Tenn.; The Shapleigh Hardware Co., St. Louis. Wm. H. Ziegler Co.; Minneapolis, Minn. AGENTS: Fleming & Cardozo, Richmond, Va.; K. C. Banks Co., Los Angeles; F. W. Cooper Engineering Materials, Ltd., Montreal, Canada.

Hy-Crome Nut Locks

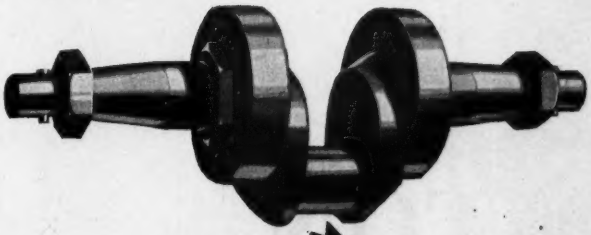


Keep Tight Joints Tight

RAILWAY ENGINEERING AND MAINTENANCE
Entered as second-class matter June 23, 1916, at the post office at Chicago, Ill., under the Act of March 3, 1879. Published Monthly by Simmons-Boardman Publishing Company at 608 S. Dearborn St., Chicago. Subscription price, United States, Canada and Mexico, $2.00 a year; foreign countries, $3.00 a year.

Alphabetical Index to Advertisements, Page 38 Classified Index to Advertisers, Pages 36 and 38

A Crank Shaft of Superior Construction



Built for Service for the New Mudge, Class "W" Engine

GUARANTEED **for the life of the motor against failure of crank or bearing.**

The Shaft

Short, sturdy, one-piece crank shaft with liberal bearing surface and tapered fit for flywheels. Oversize roller bearings to resist both lateral thrust and radial load and to insure long wear. Garlock graphite packing renders crank case gas tight.

The Engine

Two-port, two-cycle water-cooled with aluminum hopper. All parts easily accessible. Close assembly, compact construction and light weight.

Develops 25 per cent above 8 horsepower rating.

The Car

"All-Service Car" for one man or fifty. Central mounting, perfect balance, free-running belt drive. "The one car for all jobs."

"An engine is only as strong as its shaft"

Since the driving force of a motor is transmitted through its shaft, the capacity of an engine to deliver maximum horse-power continuously and unfailingly depends largely upon the sturdiness and integrity of that shaft.

The new Mudge, Class "W" Water-Cooled Engine owes its endurance and power, not only to its perfection of mechanical detail throughout, but also to the superior construction of its crank shaft. This is made with the care and precision of an automobile shaft—of drop forged, special alloy steel, heat treated, perfectly machined and equipped with Bower roller bearings.

This dependable motor constitutes the power unit of the Mudge "All-Service Car," a universal type for section, bridge or extra gang duty. The efficiency, utility and economy of the "All-Service Car" exemplify the reliability of the motor and show why the new Mudge Engine may be so advantageously utilized for any and all replacements.

Investigate the valuable features of this new and proved design by sending for bulletin WS-1.

Mudge & Company

Manufacturers—Railroad Equipment
Railway Exchange Bldg. • CHICAGO

The HORTON Conical-bottom Tank

Standardize *on the* Tank that Does 3 Things

THERE never was a tank to rely on like the Horton conical-bottom. Why? Because it has a canny knack of being useful almost anywhere. Primarily, it is used for water treatment, water settling and roadside delivery.

In these three uses it has no equal. No other design will meet the exacting requirements of railroad maintenance engineers. In popular parlance, the Horton conical-bottom "delivers the goods."

For Removal of Suspended Matter

Horton conical-bottoms have lately been used successfully to remove finely divided matter in suspension in water for railroad boilers. The Yazoo and Mississippi Valley Railroad has installed these conical-bottoms for the sole purpose of removing the suspended matter encountered in water at Baton Rouge, Louisiana. Scale-forming solids were almost entirely absent, and the conical-bottom tank was chosen as the best means of settling out the suspended matter. The ease of sludge removal was an important factor in the selection.

The conical-bottom made this water entirely satisfactory for boiler use. The installation needs little care, for it functions entirely by the sure force of gravity.

For the Softening System

Where scale-forming solids are found in the water supply, softening becomes necessary to get best results. Our engineers have worked out Horton conical-bottom installations which are proving to railroad men the superiority of this tank in water treatment. The advantage of using the conical-bottom is that there is no dead water space—the entire volume of the tank is used and all the water is thoroughly treated. Excessive sludge is easily removed. Timed opening of the wash-out valve retains just enough suspended matter to make the reaction of the treating thorough. The cost of sludge removal is less than in most other systems.

(*Note:—Do not confuse the Horton* ***conical-bottom*** *with the old unscientific cone-bottom.*)

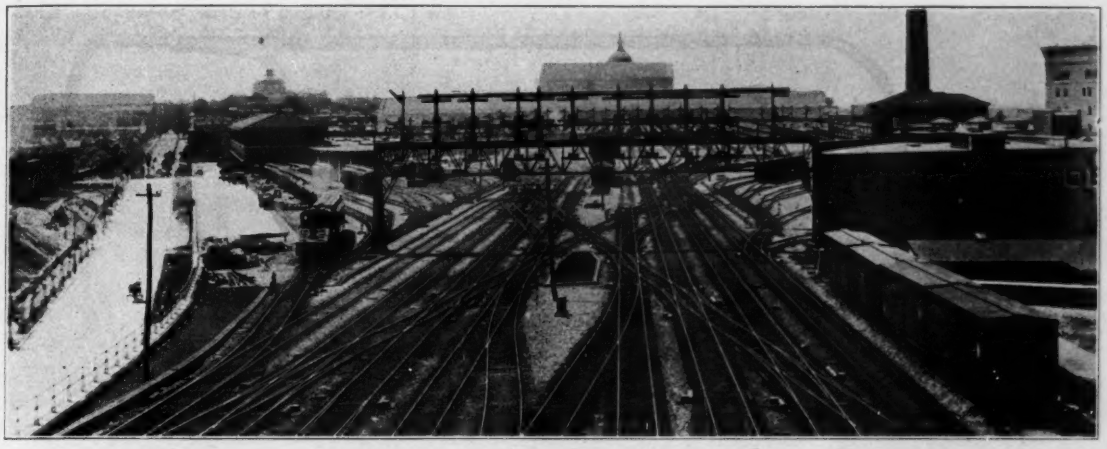
For Roadside Delivery Service

Because they last indefinitely, because they do not leak, because they are not affected by the climate or the weather, because they cannot burn, rot or fail from other causes, and because they require no maintenance except painting every three or four years, Horton *all-steel* elevated tanks provide a long-run economy which more than one hundred leading railroads are taking advantage of.

Installation of a Horton conical-bottom *steel* tank for roadside delivery purposes relieves the railroad official from worry, because we assume responsibility for materials and workmanship. The steel tank is cheapest in the end; the conical-bottom steel tank gives the best service during its long life.

Chicago Bridge & Iron Works

251 CHICAGO 2452 Old Colony Bldg. DALLAS 1646 Praetorian Bldg. SAN FRANCISCO 1007 Rialto Bldg. NEW YORK 3156 Hudson Terminal Bldg. ATLANTA 1036 Healey Bldg.



Entering the Washington, D. C., Terminal.

Railway Engineering and Maintenance

Formerly the Railway Maintenance Engineer

Vol. 20 January, 1924 Number 1

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WOULD YOU LIKE TO KNOW

How to get a foreman out of a rut?
How to design a filtration plant?
How to save money with a drag line outfit?
How to install corrugated pipe culverts?
How long a motor car may be operated without general repairs?

Answers to these and other practical questions will be found elsewhere in this issue.

ELMER T. HOWSON, *Editor*
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MILBURN MOORE, *Associate Editor*
DAVID A. STEEL, *Associate Editor*
H. F. LANE *Associate Editor (Washington, D. C.)*

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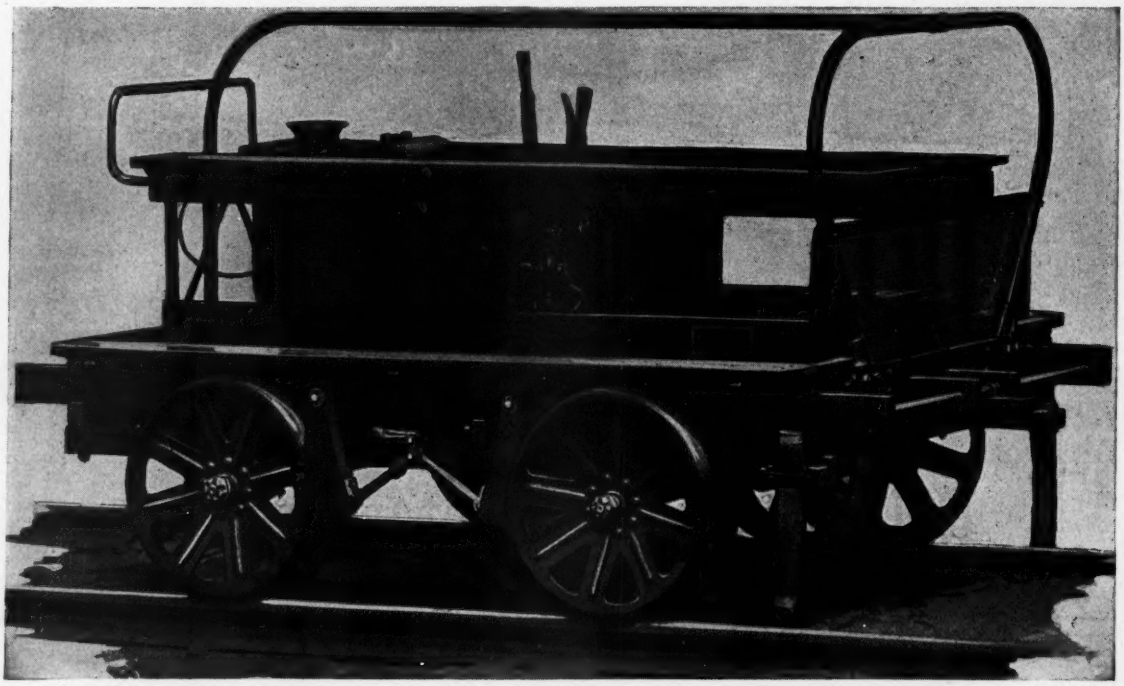


Reasons for Fairmont Leadership and Economy

Three-Bearing Ball-Bearing Crank Shaft

Ball-bearing crank shaft supported on three bearings instead of two. Note how all pulley-*overhang* is overcome by the *third* or end bearing (at right). Holds pulley in perfect alignment. Prevents crystalizing of steel shaft, and breakage. The only safe and wholly efficient crank shaft mounting.

Note These Figures

Time.....July, 1923

Place: Division Transcontinental Railroad

Performance: Forty Class M2 Section Cars perform all the tasks on 40 sections carrying average of seven men and tools and pulling trailers with supplies and material for road-bed. Covered 9600 miles averaging 25.8 miles per gallon of gas.

Cost per 100 miles:

Operation	$0.81
Maintenance	.83
Overhead	1.10
TOTAL	$2.74

Name of Railroad furnished on request

Performance on the Job Counts

Why They Predominate on 700 Leading Roads

Fairmont Railway Motor Cars are being used extensively and in many cases exclusively on more than *seven hundred* of the leading Railroad Systems of the United States. In every state in the Union, you'll see Fairmonts on the line.

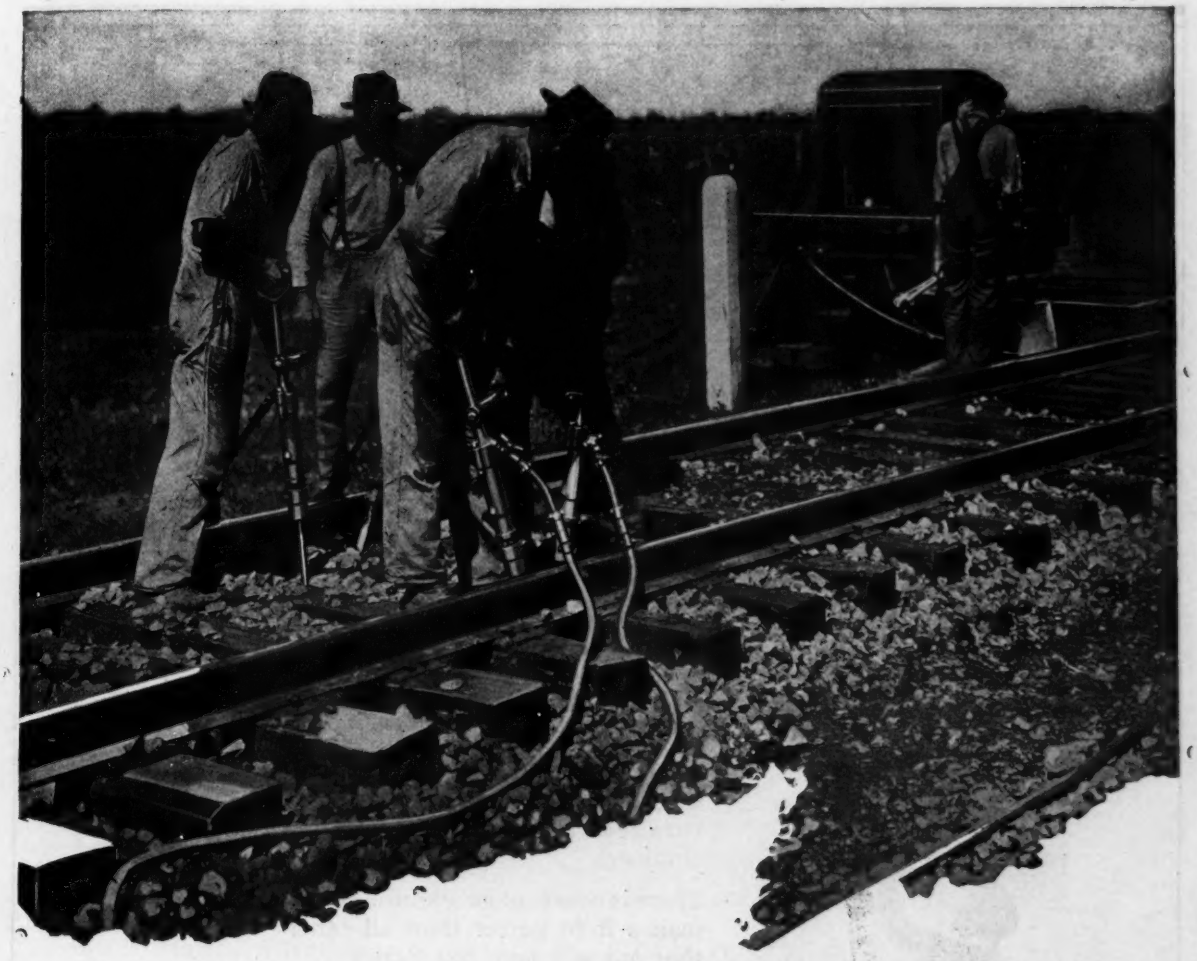
On many of these roads, Fairmonts were first tested out, subjected to every comparative test possible. Costs were kept over a period of time, costs of operation and maintenance. And so unfailingly did the figures favor Fairmonts that wholesale adoption followed as a matter of course.

Fairmonts offer you maximum power, comfort, safety and dependability at the lowest cost per *mile*, or per *thousand* miles, ever recorded. This is due to advanced engineering and to the many points of Fairmont perfection; one being the 3-Bearing Ball-bearing Crank shaft shown above. All details in bulletins illustrating our entire line. Write for them now.

FAIRMONT RAILWAY MOTORS, INC., Fairmont, Minn.

Fairmont

Ball-Bearing Motors and Railway Motor Cars



Meeting the Track Labor Problem with Pneumatic Tie Tampers

A gang of four men employing Pneumatic Tie Tampers will accomplish as much per day as three times their number tamping by hand. With the untiring power of compressed air, a firm and solid bedding is secured which hand tamping cannot equal.

Pneumatic Tie Tampers, because of the labor-saving they afford and the excellence of the finished work, have become the standard equipment of hundreds of maintenance gangs.

Ask for actual performance reports

INGERSOLL-RAND CO., 11 Broadway, New York

Offices in all principal domestic and foreign cities

For Canada refer Canadian Ingersoll-Rand Co., Limited, 260 St. James Street, Montreal

195TT

Ingersoll-Rand

An explosive should be selected like a suit of clothes

The du Pont Chemical Engineer—symbol of progress and leadership in the manufacture of products based on Chemistry.

THE explosives you use should fit *your* work.

Every quality should fit—strength, velocity, fumes, plasticity, water and temperature resisting powers, fragmentation obtained.

There is *one* explosive whose every quality makes it fit better than all others—and that one will save you money.

To provide it for you is the job of du Pont Explosives Service.

E. I. DU PONT DE NEMOURS & CO., Inc.
Explosives Department
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Du Pont Products Exhibit, Atlantic City, N. J.

EXPLOSIVES ~ SERVICE

ARMCO Culverts in Railway Service

No. 2 of a Series

Name of Railway: C. & S. R. R.—C. B. & Q. System.

Location: Main line—Denver to Billings, Mont.

Traffic: Average passenger and freight.

Installation Data: 14 ga., 18 in. ARMCO Culvert with headwalls, L-type, 6 in. fill, mostly cinders, over pipe. Date, 1911-12.

Condition: Both headwalls and pipe were in excellent condition when inspected and photographed, February 11, 1922. No rust, settlement or distortion visible.

Remarks: This installation does not merit approval because of the thin cushion over pipe. It does indicate the ability of the corrugated culvert to render good service under adverse conditions.

There is a manufacturer in almost every state and in Canada, making Culverts, Flumes, Siphons, Tanks, Roofing, etc., of genuine, rust-resisting Armco Ingot Iron. Write for full information and nearest shipping point on products in which you are interested

Ingot Iron

ARMCO CULVERT & FLUME MFRS. ASS'N, 215 North Michigan Avenue, Chicago

ARMCO CULVERTS

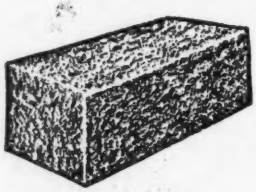
The FOLLY OF PENNY-WISE PAVEMENTS

YOU can always buy some form of hard-surfaced pavement for driveway or loading yard at less than vitrified brick will cost you—but it is rarely good business to buy it.

The *first cost* of a vitrified brick surface is also its *last cost* for many years to follow, while the "cheaper" substitute will soon demand yearly expenditures for upkeep and repairs nearly as great as its first cost.

Many a pavement in use today built of inferior substitutes for brick has already required repair expenses sufficient to construct *two* new brick pavements of equal yardage.

Would you like some evidence from official records illustrating the genuine economy of a vitrified brick paving program? Accurate comparisons prepared by impartial observers will be gladly furnished on request.



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Albion, Ill.
Alton Brick Company
Alton, Ill.
Barr Clay Company
Streator, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Cleveland Brick & Clay Company
Cleveland, Ohio
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Collinwood Shale Brick Company
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Peebles Paving Brick Company
Portsmouth, Ohio
Pittsburg Paving Brick Company
Pittsburg, Kansas
Purington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Company
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
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NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION
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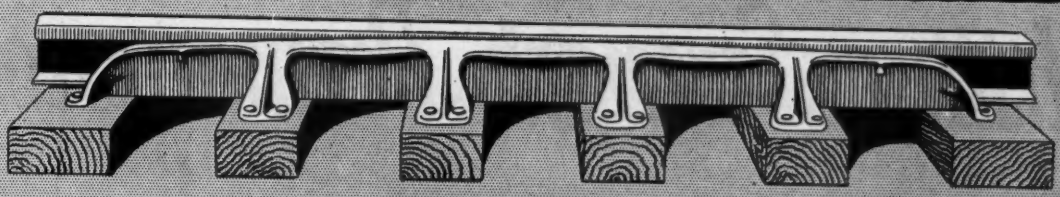
LONG LIFE LOW UPKEEP



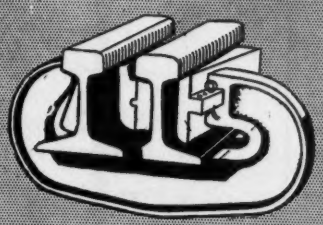
AJAX MANGANESE STEEL
ONE-PIECE GUARD RAIL

Ramapo and **Ajax** specialties have been long and favorably known under their individual names as manufactured by Ramapo Iron Works and Ajax Forge Company. These two companies are now consolidated into Ramapo Ajax Corporation, with five completely equipped works conveniently located for prompt deliveries to the railroads of the country. To assure service in the Western territory a stock of Ramapo Automatic Safety Switch Stands is carried at the Chicago headquarters.

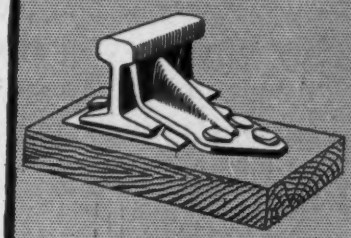
The Ramapo improved No. 20-B stand, placed on the market a year ago, has met with pronounced success. Repeat orders are coming in wherever it has been installed.

Other "RACOR" specialties not here illustrated include Switches, Frogs, Crossings, etc., Special Railway Track Work, Cast and Rolled Manganese Rail Construction, etc.

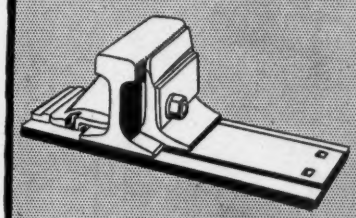
Particular attention is directed to the Ajax One-Piece Guard Rail at top of this page. Its combined simplicity and rigidity make this the most efficient and economical installation.



RACOR FORGED
HEAVY DUTY
GUARD RAIL CLAMP

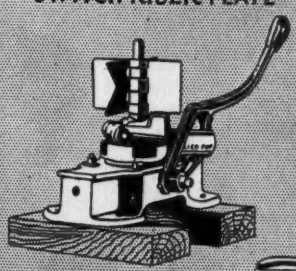


RACOR
FORGED RAIL BRACE

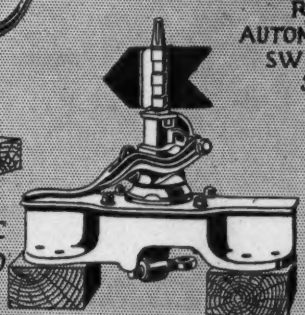


RACOR DOUBLE SHOULDER
SOLID BOTTOM
SWITCH RISER PLATE

RAMAPO
AUTOMATIC SAFETY
SWITCH STAND
Style No. 17



RAMAPO AUTOMATIC
SAFETY SWITCH STAND
Style No. 20-B



RAMAPO AUTOMATIC
SAFETY SWITCH STAND
Style No. 19

RAMAPO
AUTOMATIC SAFETY
SWITCH STAND
Style No. 18

RACOR

RAMAPO AJAX CORPORATION

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HILLBURN · NEW YORK

This Company is a consolidation of Ramapo Iron Works and Ajax Forge Co.

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SUPERIOR, WIS.

Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

Utility—Strength—Permanence

LONG-BELL Creosoted Yellow Pine Poles and Fence Posts are dependable aids in reducing railway maintenance costs. They improve service and the appearance of right-of-ways as well. They combine the utmost in utility, strength, permanence and beauty.

Long-Bell Poles are ideal wire line supports. Treating full length with the best grade English Creosote Oil by the pressure-vacuum process preserves their natural strength and makes them resistant to decay and fire. Long-Bell Posts are especially fitted for fencing right-of-ways. Preserved with creosote they are unharmed by grass fires and fortified against decay. Like the poles, they are smooth, straight and good looking.

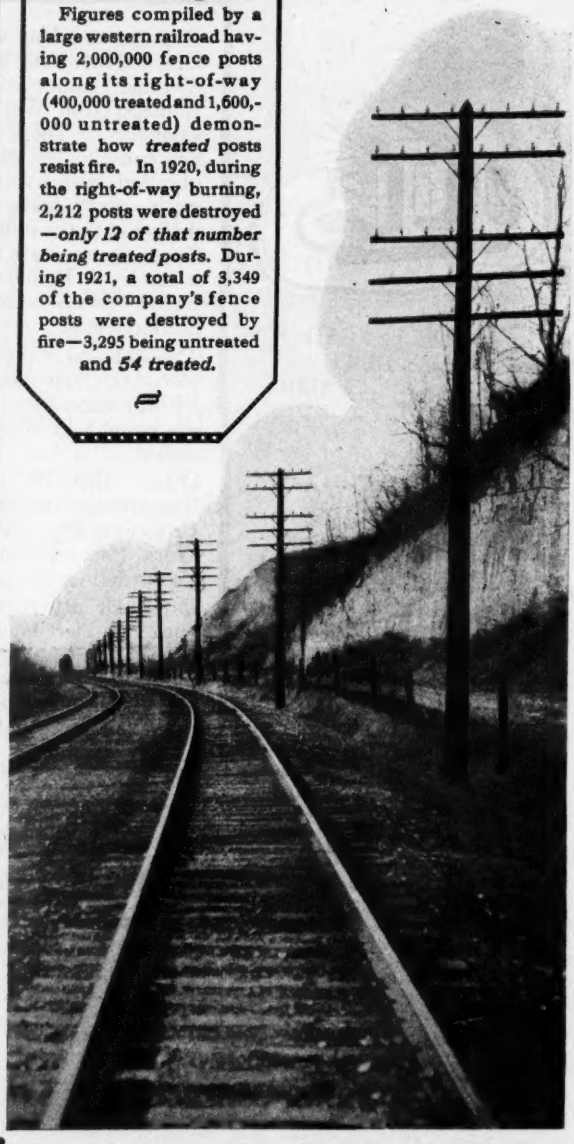
Further Information and Prices will be gladly sent on request

The Long-Bell Lumber Company
809 R. A. Long Building Kansas City, Mo.

Creosoted Yellow Pine Poles; Highway Guard Rails and Fence Posts; Ties, Timbers, Lumber, Piling and Wood Blocks

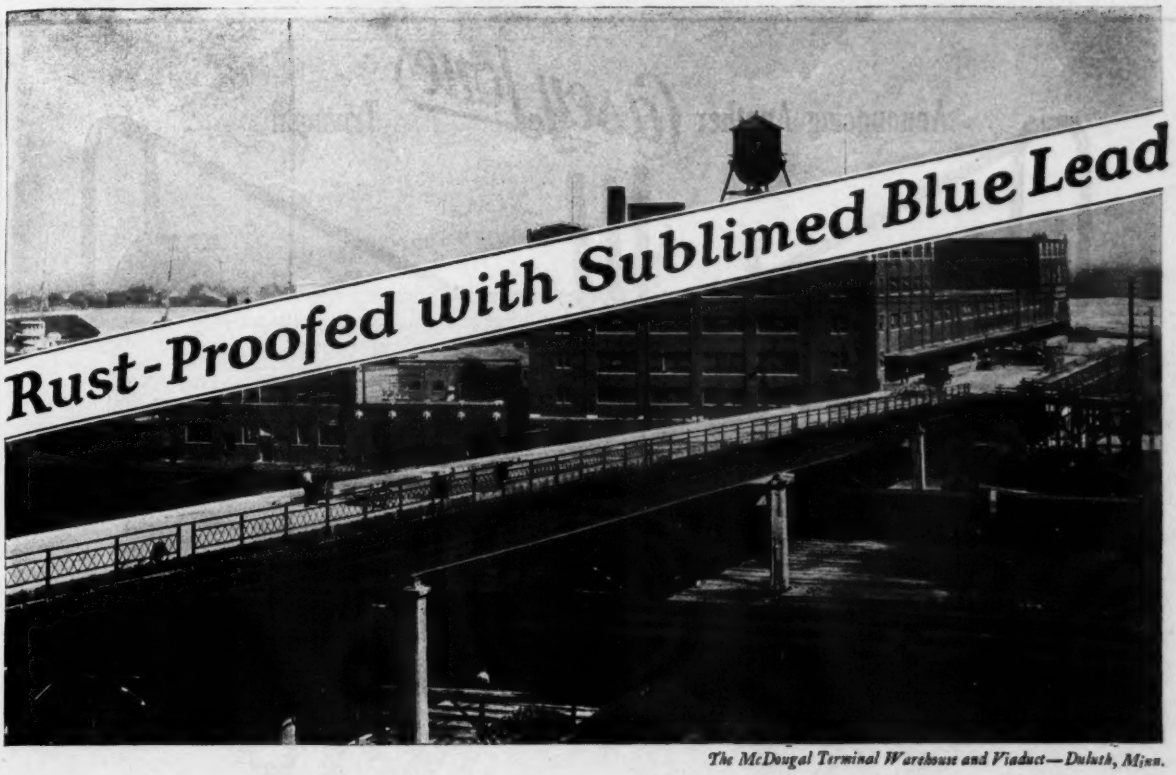
Facts and Figures

Figures compiled by a large western railroad having 2,000,000 fence posts along its right-of-way (400,000 treated and 1,600,000 untreated) demonstrate how *treated* posts resist fire. In 1920, during the right-of-way burning, 2,212 posts were destroyed *—only 12 of that number being treated posts.* During 1921, a total of 3,349 of the company's fence posts were destroyed by fire—3,295 being untreated and *54 treated.*



Long-Bell

Creosoted Poles and Posts



The McDougal Terminal Warehouse and Viaduct—Duluth, Minn.

Combating Corrosive Gases, Heat, Cold, Wind and Water

THE almost constant stream of corrosive and sulphurous gases from the locomotives plying beneath immeasurably speeds the corroding action of wind and water attacking the railway viaduct.

Jacobson Brothers, the contractors, of Duluth selected Sublimed Blue Lead in Oil to meet this most severe test of a rust-proofing paint on the McDougal Terminal Viaduct. The structural steel in the building is also protected with Sublimed Blue Lead in Oil for the life of the building.

Sublimed Blue Lead in Oil will not harden in the container.

The paint, properly mixed, works so easily and smoothly under the brush that a painter can cover a greater area in a day and still produce a paint film that is free from breaks, runs, or alligatoring. The paint film is also virtually insensible to changes in temperature.

One hundred pounds of Sublimed Blue Lead in Oil will cover 5216 square feet of iron or steel. This is equivalent to a surface a foot wide and nearly a mile long. It is practically double the performance of the pigments now most used for rust inhibitive purposes.

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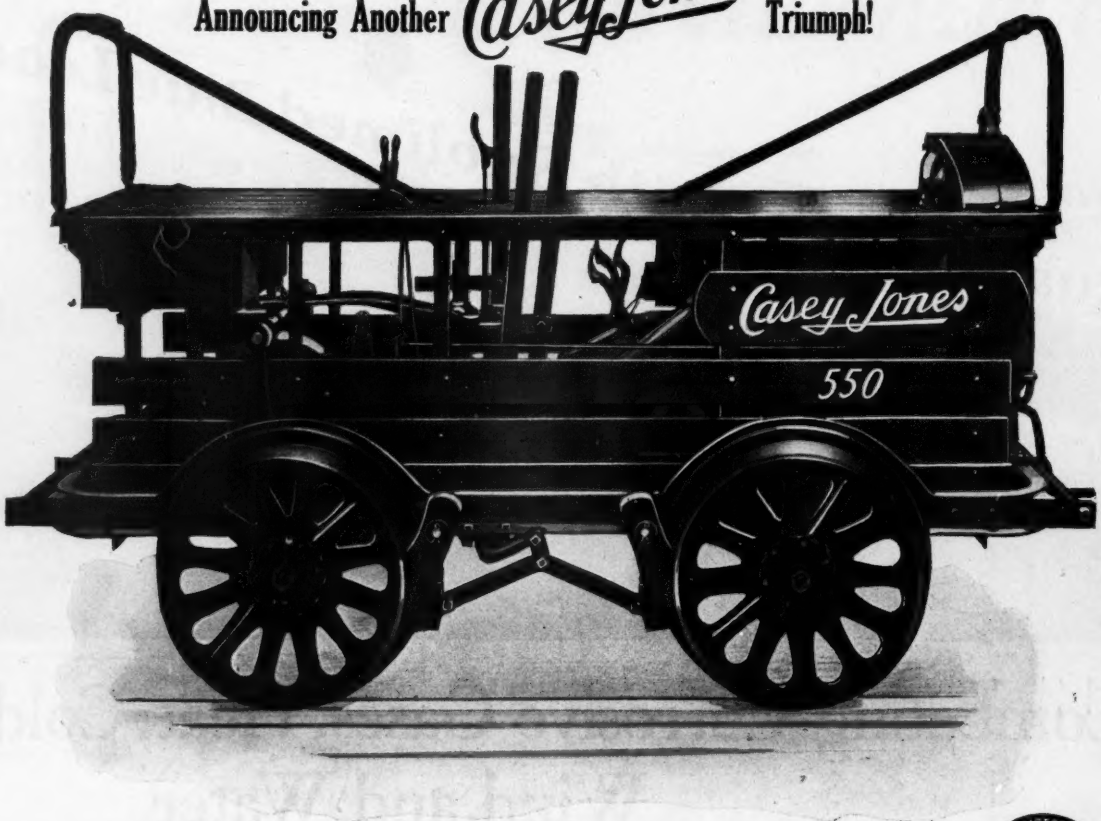

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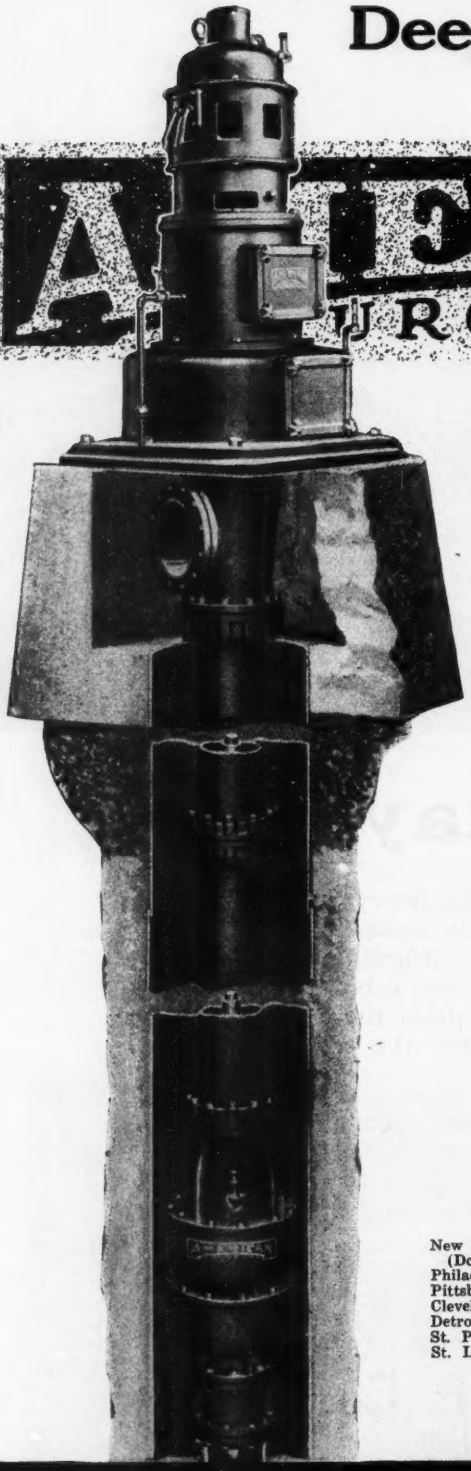

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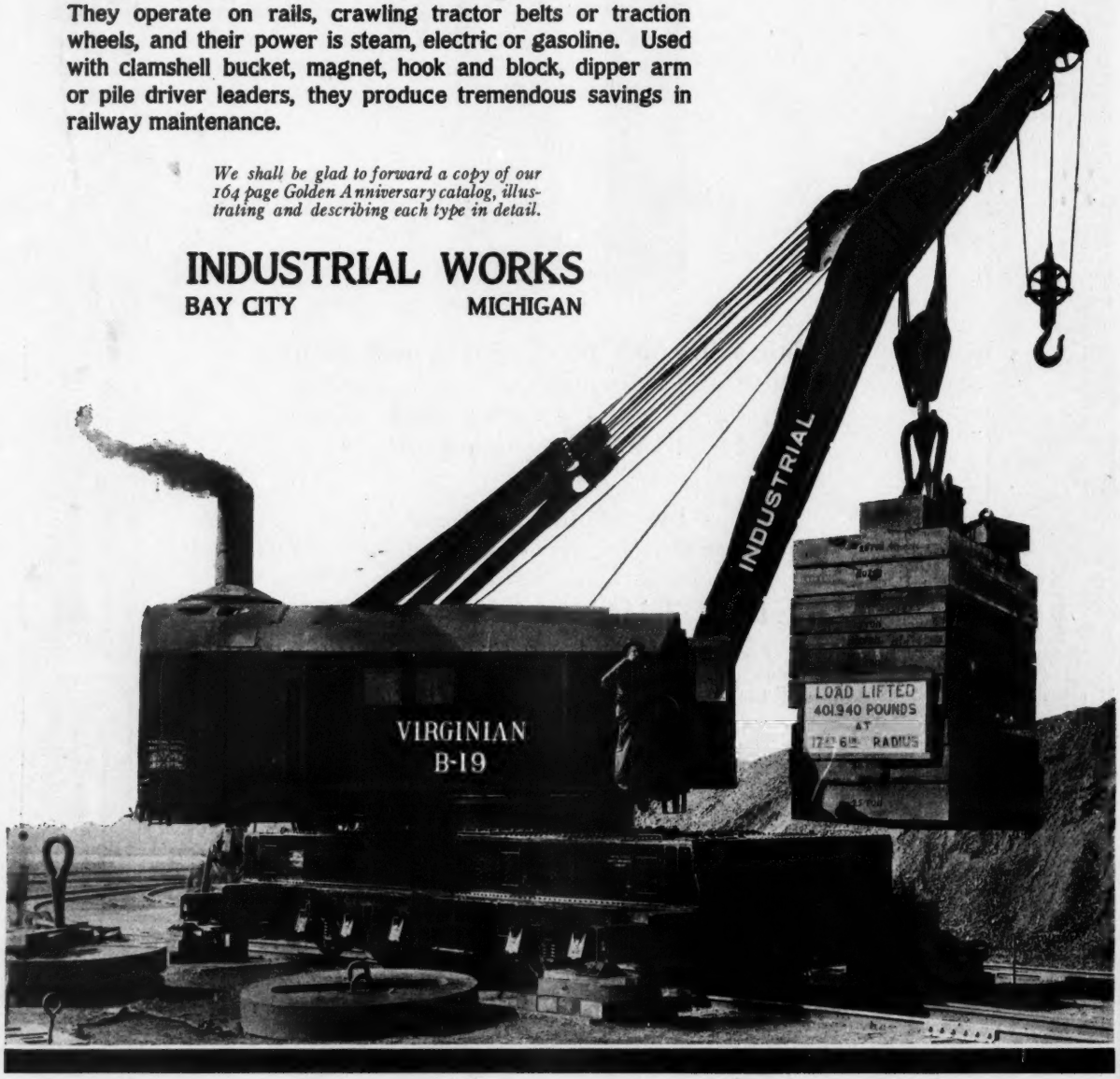


Railway Engineering and Maintenance

Volume 20 January, 1924 No. 1

THE 1923 INDEX IS READY

THE INDEX of *Railway Engineering and Maintenance* for the 12 issues of 1923 is available for distribution and will be sent without charge to those who request it. Subscribers who bind their copies or those who for other reasons desire to have this index are asked to advise the editor to this effect and it will be sent promptly.

A BUSY YEAR IS OPENING

ANOTHER year has passed into history. It has been a busy and, withal, a successful year from the standpoint of the maintenance of way department. The roads made greater improvement in the physical condition of their properties than in any year since the beginning of the war. They went a long ways towards making good the deficiencies in maintenance during the period of federal control and that immediately following and the properties have entered the winter in better condition than for a decade.

An index of the liberality of maintenance expenditures is afforded by the amount of rail rolled and laid. While exact figures for 1923 are not yet available, estimates place the tonnage rolled at more than 20 per cent above the average of the last five years. Much progress was also made in those classes of work, such as painting, which are commonly postponed during periods of retrenchment.

While this work was handled in the face of the heaviest traffic on record, the inauguration of the maintenance program early in the spring aided greatly in the completion of a large portion of it before the heaviest traffic developed. The early start also aided largely in dissipating the spectre of a labor shortage which threatened in the spring. As a whole, therefore, the year was a successful one, unmarked by serious disturbances of any kind.

All indications point to a continuance of this activity during the year now opening. The orders for rails and track fastenings which have been placed are even more liberal than last year and the rail mills are already reported to be booked to capacity until beyond the middle of the year. The improvements chargeable to additions and betterments which have already been authorized approximate those of this date last year. There are no evidences of other than the normal seasonable decline in traffic and the outlook for a continuance of heavy business throughout 1924 is promising, one index of this being the fact that more construction is now under contract than ever before at this season. All indications point to 1924 as a prosperous year for railway and railway supply companies alike.

THE RECORD OF 1923

The number of cars loaded with revenue freight on the railways of the United States exceeded the highest previous record (established in 1920) by more than 10 per cent. During nine consecutive months the loadings averaged more than a million cars weekly, whereas this figure had been exceeded only seven times previously in history and then never for more than three weeks in succession.

The traffic measured in ton miles exceeded that of the previous record year, 1920, by 2½ per cent.

This traffic was handled with a minimum *surplus* of more than 24,000 cars, although the peak of traffic was accompanied by a *shortage* of 146,000 cars in 1920 and 179,000 cars in 1922.

This service was rendered the American public at a cost to it of more than $500,000,000 less than in 1920.

This record of efficiency has been made possible by the greatest display of team work and co-operation ever witnessed in the transportation industry. It is a contribution to the public welfare of which ever employee may well be proud.

A START IN LUMBER STANDARDIZATION

EVERYONE knows that a one-inch board is not one inch thick, but no one has been able to say just how thick it really is. This is owing to the fact that there has been a total lack of uniformity in the practice of dressing lumber. Not only is there a difference in the actual sizes of lumber produced by the various groups of manufacturers in widely scattered fields, but even in the same territory the mills do not always follow the same practices. This has produced a situation which has long been far from satisfactory to the producers and consumers alike and has received the attention of the Division of Simplified Practices of the Department of Commerce to the end that a central committee on lumber standards composed of representatives of the producers, distributors and consumers was organized to give this matter thorough study.

The efforts of this committee have borne fruit and at a conference held on December 12 and December 13 the committee adopted recommended standards which provide two standard thicknesses each, for 1-in. and 2-in. lumber. Under the rules adopted a standard yard board is 25/32 in. thick and standard

yard dimension is 1⅝ in. thick. In addition, provision is made for an extra standard yard board 26/32 in. thick and extra standard dimension 1¾ in. thick. Widths of board, dimension and finish are to be ⅜ in. off for widths less than eight inches and ½ in. off for widths of eight inches and over.

The standardization of these few dimensions would seem, offhand, to represent an exceedingly small result for the many months of effort which the committee has given to this work. But when it is realized that the adoption of these standards will require changes in practice of long standing and that the meetings of the committee brought together representatives of interests of widely differing opinion, the importance of the work accomplished is brought out in its true light.

As stated by Secretary Hoover at the end of this conference, there is no law for the enforcement of these standards. Consequently they must be put into practice by force of public opinion and cohesion of the trade. For the good that will be accomplished and as a means of giving impetus to further efforts at standardization, it is to be hoped that the railroads will lend their efforts in putting the new standards into practice.

THE TRAINING OF A FOREMAN

PLACE a capable foreman in charge of a poor gang of men and he will secure at least a fair measure of results. Place a gang of efficient men under a poor foreman and little will be accomplished. A capable foreman will draw good men into a gang and hold them, while an inefficient foreman will lose them. In other words, the success of a gang depends on the leadership it receives.

The railways have built up highly specialized testing departments to protect their investments in materials of various kinds and to insure that they receive supplies of the grades specified. They conduct elaborate experiments to determine the materials best suited to their needs. They send inspectors to the plants of the manufacturers to observe that these materials are made under advantageous conditions. Yet important as these precautions are, they are designed to protect only a fraction of the expenditures of the railways, for less than half of all the money spent for maintenance of way goes for materials of any kind.

In other words, more than 50 cents of every dollar spent by the maintenance of way department goes for labor. If these precautions for the protection of the expenditures for materials are justified, and we do not question this, at least equal care should be given to the supervision of the funds which go for labor. Yet little thought is given to the selection of the foremen under whose direction the expenditures for labor are made and less attention is given to their training. As a result, a large proportion of the gangs fall far short of their possible efficiency.

Maintenance of way work is of necessity scattered and the foremen must work with little supervision. This condition makes it doubly important that these men be given the best possible training in the handling of men and in the use of materials before they are placed on their own responsibility. It is no mean task to lay out work of the variety which confronts a maintenance of way foreman in a way which will produce the best results. It calls for a high order of skill in the handling of men and well grounded experience with the use of materials.

This subject is so fundamental in its importance that no maintenance officer can afford to overlook it. No subject within his jurisdiction offers greater possibilities for savings, whether he be chief engineer or supervisor. The suggestion may well be made that each division engineer and supervisor give this subject special consideration at this season when work is at a low ebb and more time can be spent with the individual foremen, going over the details of their work with them and instructing them in ways of improving their performance.

ETERNAL VIGILANCE IS THE PRICE OF SAFETY

FEW MEN bear a more direct relation to safety of human life than those engaged in maintenance of way work. Responsibility for the safety of the tracks and structures over which fellow employees and the public are transported rests upon these employees. A slight neglect or omission on their part and human life may be the toll. The disaster at Lockett, Wyo., referred to elsewhere in this issue, illustrates what may happen, even when all reasonable precautions appear to have been taken. In this case the roadmaster passed over the structure shortly after six o'clock in the evening and the section foreman inspected it at eight o'clock, at which time he considered conditions so satisfactory that he decided that it was not necessary to patrol the track further. Yet scarcely more than an hour later a train went through the bridge into the swirling torrent and one of the worst railway accidents of the year had occurred. While the precautions which had been taken place this accident beyond any question, among those to be classed among the unavoidable and due to "an act of God," one cannot but think that it might have been prevented if the foreman had maintained his patrol for an hour longer or until the passenger train was due to pass. It is accidents such as this which bring home to maintenance of way men the responsibility which they bear for the protection of human life and the danger of taking a chance, no matter how small that chance may appear to be.

THE RULE IS DIFFERENT FOR CENTRIFUGAL PUMPS

THE centrifugal pump is no longer a stranger in railway water service. From a moderate and not very remote beginning its use in this field of operation has enlarged to an increasing degree until there are few roads of any size at present on which some centrifugal installations are not found. Their use is bound to increase, especially where roads can avail themselves of electricity for power purposes. It is evident, however, from a number of instances which have occurred in connection with centrifugal pumping installations, that there is not the familiarity with this type of equipment among engineers that there should be if accidents are to be avoided and results secured equal to reasonable expectations.

It is too well known among engineers to need much elaboration, that the accustomed practice in providing railway water facilities is comparable to that of the legendary cross roads storekeeper, who, after weighing the customer's order, throws in a few more ounces for good measure. Thus, where a pump is designed to lift 300 gal. per minute against a 100 ft. head, it is the practice, say, to order a pump capable of delivering water against a 125 ft. head and to select the power unit accordingly. In such cases it is considered that the added expense for the equipment is more than justified by the greater assurance against breakdowns and the reserve provided for unexpected demands.

But what happens when this practice is applied to the centrifugal pump? Unlike the displacement type of pump which delivers the same quantity of water regard-

less of the lift, the quantity delivered by a centrifugal pump varies widely with the lift, assuming that the same speed of operation is maintained. If such a pump is, therefore, selected to deliver a specified quantity of water at 125 ft. head a much larger quantity of water is pumped at the lower head. This increases the load on the power unit correspondingly, that is, the load actually produced is greater even than when pumping at the 125 ft. head. If this is an internal combustion engine the only result may be a continual use of more fuel than necessary, although it may so overload the engine as to cause the very uncertainty of operation which it was sought to avoid when designing the installation. If the power unit is a motor, as is more often the case, not only is there likely to be a very appreciable increase in the cost of electricity by reason of the increased amount required, but a burnout may occur.

When dealing with centrifugal pumping installations, therefore, and particularly with electric drive installations, it is not sufficient for the engineer to depend upon his technical knowledge or experience with displacement pumps. Rather he must guard against the urge of habit in such cases in the knowledge that the rule is different for centrifugal pumps. The disregard of this fact is bound to result in trouble sooner or later whereas a right knowledge will promote the economy he seeks and prevent the unpleasantries which arise where equipment fails to fulfill expectations. It is usually the better part of wisdom to inform the manufacturer thoroughly with regard to the water supply problem under consideration, but the least the engineer should do is to keep clearly in mind the distinction between the behavior of centrifugal pumps and displacement pumps and particularly the significance, relative to the first mentioned, of minimum head as distinguished from maximum head.

THE HEATING OF SMALL BUILDINGS

THE HEATING of small outlying buildings has not received adequate attention from those responsible for the maintenance of these structures. The first consideration, of course, is the comfort of the occupants and the stove or other heating unit installed must be adequate for the purpose. Secondary to this, but of more importance than is ordinarily conceded, is the economy with which the heating system is operated. There is much room for improvement in this direction for this phase of the subject has received relatively little attention. The types of stoves commonly provided for this purpose have been built for hard use rather than economy in fuel consumption, even though the amout of fuel burned in a winter commonly exceeds the value of the stove itself. The types found in many railway buildings have long since been discarded in most other buildings of similar character and it would seem that the railways might study this trend with value.

There is another phase of the problem of heating small buildings which warrants attention, namely, the placing of those buildings in condition so that they can be heated economically. The proper maintenance of the foundations, the extension of the siding to the ground and the closing up of cracks will prevent the escape of much heat and reduce the amount of fuel consumed. Since the care of the buildings and the installation of the heating facilities come ordinarily under the supervision of building supervisors, they have a responsibility to not only provide a sufficient amount of heat, but to provide it with the maximum economy. This subject is particularly timely at present when we are in the midst of winter for any improvements which can be effected will be reflected in economies immediately.

Letters to the Editor

GRADUATED PAY AND ADVANCEMENT FOR SECTION FORCES

Royersford, Pa.

To the Editor:

A question often asked is how to keep men in the maintenance of way department? A partial answer is to pay the track man with longer service and experience more money; give the men who have been in service three years one cent per hour more than those of lesser service. At the end of five years' service give another increase and again at the end of 10 years. Give all men bonus money from April 1 to October 31 of each year, the bonus, however, being held by the company and paid after October 31. This is the time of year that the most men are needed. Instead of putting on a large summer force each gang should keep two or three men almost all of the time, especially on the main lines. This would give them steady work and create a desire for advancement. Dispense with all extra gangs since they have no responsibility for completing a certain amount of work at a definite time. They simply assist the section foremen in doing their regular work and the section foremen remain responsible for the condition of the tracks when the work is done.

The best laborer should become a foreman when the opportunity arrives. A man should not be made a foreman unless he has first served as a laborer and then as a sub-foreman. In these days a bright man does not want to serve a number of years in a gang with a pick and shovel before being advanced to foreman and then be paid only about the same wages as the common laborer in an industrial plant, who works only 5½ days per week, while he toils six days and is also subject to call at any time. Some men have remained in the service of a railroad long enough to be advanced to foremen but under present conditions that is about the limit of their advancement. If a foreman is competent to handle his section and is able to help his neighboring foreman by advice or otherwise, he should be allowed to assume more responsibility, being given a large territory for the care of which he should be paid more money. This arrangement would also give the foremen of these large sections more men with which to handle rails and to line and surface track between scheduled trains. Some of the large jobs cannot be done with a few men in the time available and they may often be left undone for too long a time.

Under present conditions, there is not much chance for advancement and some men ridicule others for taking an interest in their work and trying to advance themselves and the best interests of their company. They say, "Go to it old boy. Some day the railroad company may will you some money." But, if these men are given a chance to advance and a good reason to work for the best interest of the company, they can some day laugh at their neighbors who are not doing their full duty. I think that if some of these ideas were applied, there would be a vast improvement in the morale of the maintenance of way department.

A. BOLOGNESE,
Section Foreman, Philadelphia & Reading.

CIVIL ENGINEERS TO HOLD MEETING.—The American Society of Civil Engineers will hold its twenty-first annual meeting in New York on January 16 to 18, when the annual reports will be read, officers for the ensuing year elected, prizes awarded and other business transacted.

Remodeled Plant Solves Mud Problem

Conical Bottom Tanks Provide Additional Settling Capacity Required in Filtering Mississippi River Water

BY C. R. KNOWLES
Superintendent Water Service, Illinois Central, Chicago

THE Yazoo & Mississippi Valley, a subsidiary of the Illinois Central, has recently completed alterations to its filteration plant at Baton Rouge, La., as a result of which it now has in operation at that point facilities which are proving very successful in removing the finely divided matter in suspension from the Red and Mississippi rivers. In providing a water supply for the Baton Rouge terminal the original problem was one of deciding between the use of ground water or water from the Mississippi river. The deep well waters in this territory are remarkably free from scale-forming solids, but as they carry from 20 to 25 grains of foaming salts, 10 to 15 grains of which are alkali carbonates, there is a decided tendency toward foaming when using this water in locomotives. The foaming is further promoted when the well waters are mixed with the river waters since the rivers carry considerable suspended matter and are the source of supply at all but one of the four water stations south of Baton Rouge, not including New Orleans, the southern terminal, which is filtered. The river water is an excellent boiler water except for the matter carried in suspension at certain seasons of the year. The following chemical analyses taken at different periods throughout the year at Baton Rouge serve to show the general character of the river water as to dissolved solids:

Representative Analyses of River Water

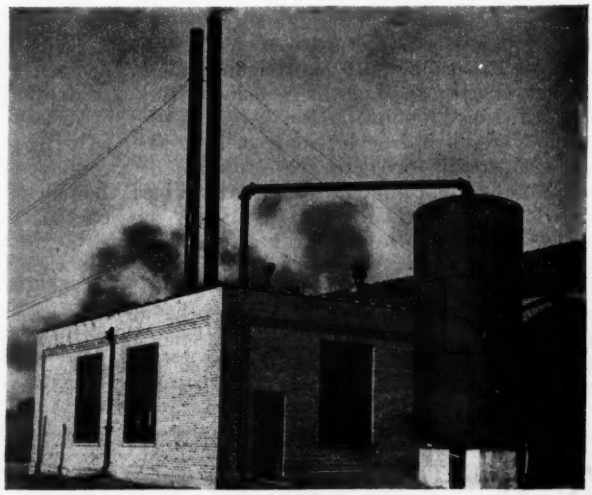
	(A) Gr. per gal.	(B) Gr. per gal.	(C) Gr. per gal.
Calcium carbonate	4.6	4.9	4.6
Magnesium carbonate	0.5	0.5	0.4
Magnesium sulphate	1.8	2.4	2.1
Total incrusting solids	6.9	8.8	7.1
Sodium sulphate	5.7	2.8	3.8
Sodium chloride	2.0	2.0	2.1
Total non-incrusting solids	7.7	4.8	5.9

In addition to the dissolved solids the river water commonly carries 10 to 20 grains of suspended matter, principally in the form of mud.

The Filters Are of the Horizontal Pressure Type

After giving the matter careful consideration from the standpoint of the use of the water in locomotive boilers, it was finally decided to use the river water and to install filters for removing the mud. As pressure filters of the Jewell type are used successfully to remove the suspended matter from Mississippi river water at the Vicksburg, Miss., and Harahan, La., shops, filters of a similar type were installed at Baton Rouge. The filters are of the horizontal type, the battery consisting of two filter tanks 8 ft. in diameter and 15 ft. long, with a combined filtering capacity of 28,000 gal. per hr., although the filters were actually operated at a rate of only 20,000 gal. per hr., or less than two gallons of water per square foot of filtering area per minute.

A pressure sedimentation tank 10 ft. in diameter and 20 ft. high was installed to remove the heavy suspended matter before it reached the filters and to allow more time for coagulation. Sulphate of alumina was used as a coagulent and was fed to the supply as it entered the sedimentation tank, the feed being regulated according to the condition of the water. The water entering the sedimentation tank at the bottom passed out at the top and was delivered directly to the filters. As the capacity of the sedimentation tank is approximately 12,000 gal., the water is allowed 35 min. for coagulation and sedimentation before passing the filters and much of the heavier matter is deposited in the sedimentation tank and blown off through the washout valve.



An Exterior View of the Filter Plant Before Remodeling Showing the Coagulation Tank Which Proved Too Small

As previously stated this type of filter had given excellent results in filtering the Mississippi river water both at Vicksburg, Miss., and at Harahan, La., and it also gave very good results at Baton Rouge except at flood periods in the Red river which enters the Mississippi above Baton Rouge. During these periods the water from the Red river, which carries immense quantities of finely divided silt, would predominate or influence the character of the water to such an extent that it was impossible to clarify the water completely. The natural content of suspended water carried by the Mississippi would often be increased from 10 to 20 grains to as high as 175 grains per gal. This not only resulted in burdening the filters with an excessive quantity of mud but also necessitated increasing the use of coagulents when the water was at its worst to more than double the normal amount used, and required so much water to keep the filters clean that almost constant pumping was necessary. The worst feature of it all was the fact that in spite of every effort the filtered water was not clear, as much of the mud was of a colloidal nature and passed through the filters with the water. This condition occurred about four or five months out of the year and apparently with increasing frequency.

After repeated experiments, which included changes in the size and character of the filter sand, the thickness of the filter beds, the method of operating the filters and

feeding the coagulent and the introduction of other chemicals during the time the Red river water predominated, it was found that the only way in which the finely divided particles could be removed was by allowing a much longer time for coagulation and sedimentation than was provided for in the original installation.

Conical Bottom Steel Tanks Added

The experiments developed that there were times when from eight to nine hours coagulation time was required to clarify the water satisfactorily. It was therefore decided to install additional storage for coagulation. Considerable study was given to the design of facilities for the purpose and the conclusion was reached that the conical bottom steel tank offered the most economical solution, not only in first cost but also in the cost of operation. Concrete tanks or basins represented a much greater cost than the steel tank and while the standard creosoted wooden tank could be built at considerably less expense, both concrete and wooden tanks offered the same objection from a standpoint of operation; namely, the removal of the sludge. The flat bottom wooden tank necessitated an expensive sludge system with a great waste of water in the removal of the accumulated mud and while this feature could have been overcome with a concrete basin by constructing it with a conical bottom the cost was almost prohibitive. Therefore, the conical bottom steel

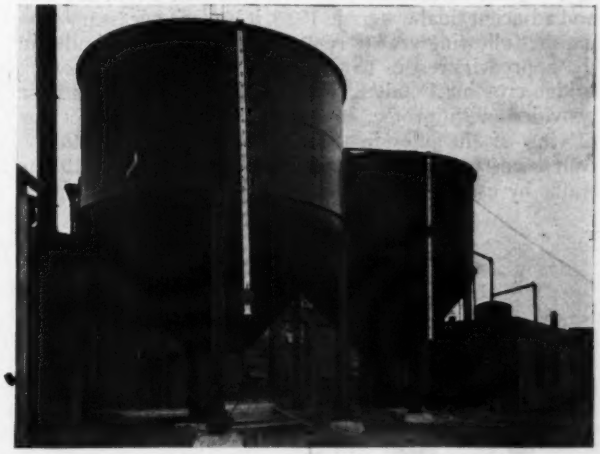
Interior of Plant Showing Battery of Filters

tank was adopted as being the most satisfactory design. Plans were prepared for two 100,000 gal. tanks of the same design as the standard roadside tank except that the mud drum or riser was reduced to a height of 9 ft. 6 in., making the total height of the tank 35 ft.

The Tanks Are in Series

The tanks are used in series, the flow of water being continuous when the tanks are in service. The water passes from the closed sedimentation tank to the first settling tank where it enters near the bottom and rises slowly to the top and then to the bottom of the second tank after which it is taken from the top through a floating intake pipe by a motor-driven centrifugal pump and forced through the filters to the roadside tank and distribution system.

The results obtained from this installation have been highly gratifying as it is now possible to produce a perfectly clear water at all times and at much less expense than before. The amount of water used for washing filters and sludging tanks is reduced from about 60,000 gal. per day to 15,000, while the amount of alum used daily shows an average reduction of 160 lb.



The Bulk of the Suspended Matter Settles Out in Two Conical Bottom Steel Tanks

The total estimated annual saving through the installation of the settling basins is arrived at as follows:

16,425,000 gal. of water saved in washing at $0.02	$ 328.50
57,600 lb. of sulphate of alumina	1,050.00
Saving in fuel oil by reason of lower head	144.00
Saving in repairs to filters, changing sand, cleaning, etc.	2,168.00
Total gross saving	$3,690.50
Cost of current for the rehandling pump	$1,328.40
Maintenance of additional equipment	360.00
Interest on cost at six per cent	600.00
Depreciation at three per cent	300.00
Total additional expenditure	$2,588.40
Net saving in operation	$1,102.10

In addition to solving the problem of removing the mud the settling tanks show a net saving in operation and maintenance, after deducting interest and depreciation charges, of 11 per cent on the investment, while the saving in the reduced number of boiler washouts is estimated at $5,760.00 per year.

COOLIDGE ON CONSOLIDATIONS.—Legislation to expedite railroad consolidation by aiding and stimulating voluntary consolidation were recommended by President Coolidge in his first annual message to Congress on December 6. These proposals were offered as constituting together the only available means of bringing about rate reduction while maintaining an adequate transportation system. The President had the following to say about the Labor Board: "The settlement of railroad labor disputes is a matter of grave public concern. The Labor Board was established to protect the public in the enjoyment of continuous service by attempting to insure justice between the companies and their employees. It has been a great help but is not altogether satisfactory to the public, the employees or the companies. If a substantial agreement can be reached among the groups interested there should be no hesitancy in enacting such an agreement into law but if not reached, the Labor Board may very well be left for the present to protect the public welfare."

Scow Driver Is Fitted with Pendulum Leads

ON ACCOUNT of the ravages of the Xylotra (the giant or plumed pileworm) in San Francisco bay and adjacent tidal waters in 1920, it became necessary during the following year to replace the old untreated piles in the approach trestles to the Northwestern Pacific swing bridge crossing Petaluma creek at Black Point, with piles provided with protection against marine borers. The driving of the piles in the new bents (six piles to the bent) was accomplished with no interference with the traffic by use of the company's scow pile driver equipped with pendulum leads with stop timbers and a 90-ft. mast for raising piles into position in the gins.

The Pile Driver in Action

The arrangement of the pendulum leads is shown in the photograph appearing above. The leads were suspended from a cantilever framework bolted to the tower on the scow, the pivot pin being placed about 12 ft. from the front face of the tower. This distance proved to be ample for keeping the bow of the scow clear of the adjacent batter piles. The leads were held in the position desired, either plumb or batter, by means of the horizontal stop timbers bolted to the lower end of the leads and extending along and beyond the sides of the tower.

The elevation of the bottom of the improvised leads was planned just to clear the deck of the trestle at low tide, therefore making it necessary to use a "punch" or "follower," 16 ft. long, in driving during the high tides. The leads were held securely in line of the axes of the various piles by holding the stop timbers in a fixed position with the aid of one inch pins dropped vertically through holes in the stop timbers and the cross supports.

The 90-ft. mast was a necessary feature of the driver on account of the great length of the pile (between 90 and 100 ft.), since without the boom the piles could not have been raised high enough to place them between the stringers of the trestle. All of the piles were driven with the driver on one (the south) side of the trestle.

The piles were protected against marine borers by the following, applied in the order named: P. & B. pile paint, P. & B. burlap base roofing, ½ in. by 2 in. redwood battens and "Floatine" (an asphalt base paint applied hot).

I. C. C. Reports on Lockett, Wyo. Accident

AN EIGHT-CAR passenger train on the Chicago, Burlington & Quincy went through a pile trestle near Lockett, Wyo., at 9 p. m., on September 27, resulting in the death of 17 passengers and 4 employees, while 7 passengers and 3 employees are known to be missing. This accident occurred on a single track line on a curve of 1 deg. 22 min. The structure was a pile trestle 111 ft. in length and 20 ft. above the creek bed at the highest point. It was built in 1914 and consisted of 9 five-pile bents on 14 ft. centers, the piles being driven to refusal with a penetration varying from 12 to 23 ft. The toe of slope on the upstream side at each end of the bridge was protected with riprap. An examination of the bridge after the accident showed the timber to be in a good state of preservation without any signs of decay.

Cole creek is a small stream about 14 miles in length which empties into the North Platte river about one-fourth mile south of the bridge. It drains an area of about 130 square miles, aproximately 80 per cent of which is adobe soil which sheds water readily, the remaining portion consisting of a very sandy soil. Within this area are a number of sand bars across shallow spots which from basins or pools which, after a rain, are filled with water, sometimes to considerable depth. An inspection of this area made after the accident showed three such sand barriers which had impounded large volumes of water. A statement was made by a resident of the vicinity that at one point 11 or 12 miles above the bridge, 320 acres of land was flooded to a maximum depth of 12 or 14 ft. on the forenoon of the accident and that this water had practically all disappeared on the following morning.

The roadmaster had passed over the bridge at 6:15 p. m. at which time there was approximately 8 to 10 in. of water in the creek. When he returned to the bridge shortly after the accident 10 or 12 ft. of water was running in it. The section foreman inspected the bridge at 8 p. m., at which time the stream appeared to be about 14 to 18 ft. wide and 18 is. deep. The structure had recently received a semi-annual inspection by the master carpenter and a monthly inspection by the bridge foreman, both of whom found it in good condition.

The train was traveling at a speed estimated to have been 30 to 40 miles an hour at the time of the accident. The engine, three cars and the ends of two others, went into the stream. In his report to the Interstate Commerce Commission, the director of the Bureau of Safety concludes that "it seems probable that the large amount of water impounded by the sand bars up stream was released and that this water either weakened the bridge or washed it away entirely."

Dragline Used in Restoring Track

Experience of the Burlington Proves Practicability of this Equipment in Washout Work

AN INTERESTING use of dragline equipment in track maintenance was afforded recently in the reconstruction of a portion of the St. Francis branch of the Chicago, Burlington & Quincy, a light traffic line extending suothwesterly through southwestern Nebraska, for a distance of 134 miles into the northwestern corner of Kansas. The work undertaken was varied in character, consisting of roadbed repairs at some points, and surfacing, drainage, etc., at others. The dragline outfit was a Pawling & Harnischfeger No. 206 self-propelled caterpiller crane, using a one-yard dragline bucket on a 40-ft. boom interchangeably with a ¾-yd. bucket on a 50-ft. boom, depending on the work involved. The 50-ft. boom was made by attaching a 10-ft. extension to the 40-ft. boom.

This outfit was rented from a contractor who provided the operator, oiler, furnished the supplies and made all repairs. Where the moves were one-half mile or less, they were made by the machine under its own power, while longer moves were made by loading the equipment on a flat car and hauling it to the new location. In such cases it took about 1½ hours to crib up and run the machine onto a flat car and about an equal time to unload it, with the assistance of a track gang. The work performed may be divided into six separate jobs as follows:

Restoring Roadbed

The roadbed at milepost 66.5 was so badly washed out for 1,000 ft. that trains were operated on a shoo-fly and reconstruction of the embankment by teams was out of the question owing to the wetness of the ground. After arrival at this point about three hours were consumed in unloading the dragline, extending the boom to 50 ft. and attaching the one yard bucket, after which the outfit began working on the top of the fill, borrowing dirt from the sides to restore the roadbed as it progressed. Sufficient material was obtained by this method to contsruct a narrow fill, 1,000 ft. long, on the center line of track, following which a pile driver was enabled to drive an eight span bridge without disturbing traffic on the shoo-fly. When the bridge was finished the track was restored on the narrow roadbed and the bank widened by steam shovel and train service, the scarcity of dirt in the vicinity preventing full restoration by the dragline. The use of the dragline at this point eliminated much cribbing, temporary bridges and the raising of track under traffic with steam shovel dirt. Altogether, it handled about 3,500 cu. yd. of earth—about 70 hours working, at at the rate of 50 yd. per hour, and at a total cost of 15 cents per yd.

Filling Cribbed Washout Hole

The second job undertaken by the dragline was the filling of a washout hole about half a mile beyond the previous work. This was a narrow hole about 12-ft. deep and 40-ft. long, which extended across the right-of-way, making team work difficult and steam shovel work inadvisable owing to the fact that the track was cribbed over the hole for a distance of about 300 ft., with about 200 new treated ties which it would have been necessary to abandon if the dirt was dumped from cars. The dragline work was somewhat delayed by the progressive removal of the cribbing and the necessity also of double casting much of the dirt, but it was performed without other difficulty, permitting the salvage of the ties and producing a more compact fill than would have resulted if the ties and cribbing had been left in the hole. Approximately 450 yd. of material was handled at a cost of about 34 cents per yd.

Restoring Badly Cut Roadbed

The third work undertaken by the dragline was located about three miles beyond the point just described, where the roadbed was so badly washed and cut that trains were operated over a shoo-fly 800-ft. long. This was another instance where teams could not be used, owing to the wet condition of the material and where the dragline afforded the means of eliminating much cribbing and temporary bridging. The work of restoration consisted of building a narrow fill to grade from side borrow,

The Gang of Men Required Was Relatively Small

after which the track was placed on this fill and the roadbed restored to full width by hauling dirt to make up for a deficiency of material in the vicinity. About 300 cu. yd. was hauled by a work train and dumped from the shoo-fly, after which it was placed in the fill by the dragline. Altogether, about 2,500 cu. yd. of material was handled by the dragline, in 55 working hours, during which the dragline also assisted the bridge gang in recovering considerable 48-in. concrete culvert pipe which had been dislodged and scattered for distances up to 100 ft. It cost about 18 cents per yd. to handle the dirt at this point.

Loading Work Trains

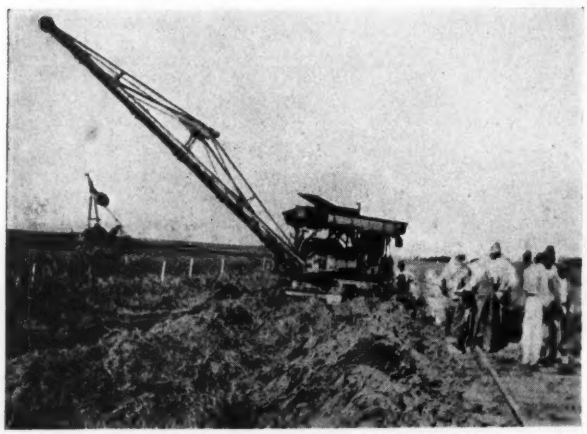
This job was located at Mile Post 93, about 23 miles beyond the preceding point, and consisted chiefly of loading dirt into work trains for restoring washed banks and the filling of cribbed holes in the vicinity. It was found desirable here to secure the dirt from the Atwood yard where by so doing about 400 ft. of track would be made available for team tracks. The yardage was too small to warrant the cutting in of a steam shovel and moreover the dragline could be employed to much better advantage than the steam shovel since the bank was

narrow, necessitating frequent moving of the machine. Also the dragline could load on either of two tracks, while the steam shovel could load cars on neither of them but would have required a special loading track. Altogether, about 3,000 cu. yd. of earth were loaded by this method in 61 hours. This earth was then hauled by a work train two miles and dumped on the roadbed. Figuring in the seven hours required to move from the previous job to this point and an average of two hours per day lost on account of traffic delays, it cost about 17 cents to load the work trains by this method.

The dragline was also used in furnishing dirt to a work train at a second point where 8,840 yd. was excavated and loaded on cars in 113 hours, the cost of this work, almost 9½ cents per yd., being much less than at Atwood, since the dirt only had to be hauled one-half mile and there was no cribbing to remove and delay loading operations.

Raising Grade

The economy of the dragline was especially pronounced at two points where grade raising operations were carried out. At one point the track was raised a maximum of four feet for a considerable distance, requiring about 4,800 cu. yd. of material, all of which was obtained from the borrow along the track, most of which was wet. In this case a track gang of 12 to 15 men was employed to raise the track, while the dragline



The Dragline Proved Especially Economical in Grade Raising Work

was operated alongside, excavating the borrow and casting it onto the track. The method of raising was to jack up the track about two feet at a time, using long jacks for this purpose and tamping the material in place as dumped. When not casting into the track, the dragline was employed in building up the shoulders. Track raised in this way requires more after-attention than where a six inch to eight inch raise was made, but less men were required than where the dirt raises were made, a gang of 30 to 40 men having been required in such cases as well as considerable cleaning up. About 80 hours of dragline casting was required to handle the 4,800 yd. of material in spite of the fact that much of the earth was wet.,

The second instance where a dragline was used for making a raise in grade involved 1,500 ft. of track where a maximum raise of two feet was made. In this case the dragline was employed only for furnishing material for the raise but to convert the borrow pit into a large ditch to carry off considerable drainage encountered in this vicinity. Altogether about 4,800 yd. was excavated by the dragline in 110 working hours, while at the same time a ditch about 10-ft. wide was constructed. The material encountered was a very heavy, tough sod and the earth much wetter than on the previous job. Also the track gang employed was smaller but the entire work was carried out with success.

Cleaning Out Channel of Creek

In addition to the work described, the dragline outfit was also employed in cleaning out an old channel of a creek which had become overgrown with trees, chiefly willows, and filled up to a considerable degree, a condi-

Most of the Material Was Wet and Impossible to Handle with Teams

tion which resulted in washouts at every flood. The grade was raised at this point by means of a work train, using dirt supplied from a steam shovel, rather than by dragline methods, since the dragline was in use elsewhere at that time. The dragline was set to work between the channel and the track, cleaning and widening the channel and casting the dirt onto the roadbed, which was thus built up to full width. The trees had been cut from the channel by a clearing gang but the stumps remained. The dragline removed the stumps and roots satisfactorily, some of the stumps running up to six inches in diameter. Altogether about 600 yd. of material was excavated, in about 140 hours of dragline work and at a cost of about 16 cents per yd.

This work was carried out under the direction of W. H. Eiker, district engineer of the Nebraska district, and under the general direction of F. T. Darrow, assistant chief engineer, with headquarters at Lincoln, Neb.

An Example of Stucco Work—The Southern Pacific Station at Los Angeles, Cal.

Railways Complete Successful Year

Developments of 1923 Reviewed. Many Improvements and Liberal Maintenance Programs Planned

THE YEAR which has just closed was the most satisfactory from the standpoint of the railways of any since the war. The outlook for 1924 is equally promising. These statements are based upon statistics and other information published in the annual review number of the Railway Age for January 5 from which the following is abstracted.

The activities of the railways during 1923 reflected in a large measure the more nearly normal conditions of that year. The scope of the work done was not confined to any one department, but was well distributed throughout all branches. Although the number of miles of first track constructed remained small, the amount of second track which was built was greater than in any year since 1913. The miles of lines abandoned and taken up and the miles abandoned and not taken up declined considerably from the figures of previous years. Construction other than track was carried forward in a widespread program of a healthy and comprehensive nature. In the equipment field, the production of freight cars was unusually large, being 175,748 cars, although, as a result, orders placed during the year were considerably less than in 1922. The production of locomotives was approximately twice that for 1922 and with the exception of 1918, was greater than during any year since 1913. Passenger car production was the largest since 1917 while orders were practically equal to those for 1922.

New Lines Constructed and Abandoned

During 1923, 427.27 miles of first track were built in the United States, as compared with 324 miles in 1922. Similar figures for 1921, 1920 and 1919 are 475,314 and 686 miles respectively. The total mileage of first, second, third and other main track built was practically double that of the totals for each of the three preceding years, reaching 1176.07 miles of which 683.99 miles, 41.73 miles and 23.08 miles represented second, third and other multiple main tracks respectively. The second track built in 1922, 1921 and 1920 aggregated respectively 195.97, 143.07 and 90.87. Second track thus shows a healthy increase, the amount exceeding that of any previous year back as far as 1913, when approximately 1263 miles were completed. The nearest approach to the 1923 figure, in recent years, was in 1918, when 681 miles were built.

In Canada, the amount of new first track increased greatly over 1922 or 1921, reaching a figure of 654.59 miles, of which all but 88.29 miles (the work of the Canadian National) was constructed by the Canadian Pacific, which built or put into operation a total of 566.3 miles. This represented chiefly the completion of a number of branch lines which the road has had under way for a number of years for the opening up of new territory. Approximately 128 miles of line were abandoned in Canada during the year, on 92 miles of which the track has been taken up. This mileage was abandoned by the Canadian National and is presumably one of the results of the consolidation.

Except for the work of the Alaska railroad, the mileage of first track which was constructed during the year consisted chiefly of small units varying from a fraction of a mile up to a few isolated maximums of about 30 to 35 miles, representing generally short extensions of a minor nature rather than any tapping or opening up of new territory. The greatest amount of first track built in a single state was 84.22 miles in California, with Utah second with 43.23 miles, the mileage of the former being almost entirely that of the Southern Pacific and the Minarets and Western.

A Large Mileage of Second Track Was Built

California was also in the lead in respect to second track, 111.83 miles of new second track having been built which, with the 84.22 miles of first track, made a total of 196.05 miles of track completed in that state during the year. Contrary to the general tendency in first track construction, the building of second track was generally in large units, varying from stretches of from 40 miles up to 117 miles, the latter figure being that of the Atchison, Topeka & Santa Fe from Louise, Ariz., to Daggett, Cal. Arizona was second and Illinois third with second track mileages of 89.49 and 60.97 respectively. The greatest amount built by any one road was carried out by the Santa Fe, which constructed a total of 201.79 miles or only a little less than one-third of the total second track for the country during 1923. Considerable mileages were also built by the Great Northern, the Chicago, Terre Haute & Southeastern, the Southern Pacific and the Union Pacific.

Other Roadway Improvements

Construction other than track during the past year was chiefly of a nature which would effect operating improvements and, although greater than it has been for a number of years, is still presumably less than is actually needed. Terminal improvements received a large amount of attention, the items showing a wide range of this class of work throughout the country and covering such projects as engine-house extensions, machine shops, power plants, new yards and additions to existing yards, freight houses and freight-house extensions. Grade and line revision also formed an important part of the year's work, in connection with which there was some grade separation work of varying magnitude.

Although not unexpected, it is somewhat interesting to observe that the work of the eastern roads dealt chiefly with such projects as extensions and improvements of freight terminals, sidings and yards, grade separation, short cut-offs and short sections of additional multiple tracks, while that of the western roads involved a larger amount of second track development work, grade and line revision and reconstruction in conjunction with terminal improvements, the latter class of work being carried out on practically all roads.

Mileage of Abandoned Lines Declined

The weeding out of the uneconomical short lines and branches of the larger roads was still in effect in 1923 although not on such a large scale as in the previous years. The mileage abandoned and taken up (128.82 miles) during 1923 was about one-half of that for 1922, 1921 and 1920 and about one fourth or less than that for 1919 and 1918. The mileage abandoned and not taken up (384.13 miles) was about one-fifth of that of 1921 and, in general, considerably less than that

for 1922 and the preceding years other than 1921. In a way, this decline in the amount of mileage abandoned may be attributed to the slightly better conditions which the short lines and branches are facing today and to the fact that most of the most unprofitable lines have already been abandoned. Some few of these almost destitute roads have found relief by the installation of gasoline-operated motor coaches. The fairly generous adoption of this class of equipment by the smaller roads in the poorer territories and also by the large roads on their less productive branches, seems to offer a reasonable hope for the retention of many of the remaining short lines and branch lines which are on the border of financial ruin, although many others will undoubtedly be abandoned from time to time in the future because of changed conditions of the territories which they serve.

Marked Increase in Signal Construction

Although automatic train control was the feature of signal work of paramount interest, the construction of this class of work showed a marked increase during 1923. A total of 2,695 miles of road in United States and Canada was equipped with block signals, automatic and manual, during the past year, as compared with 1,533 miles in 1922. Of the mileage completed in 1923, 676 miles represented manual blocking and 2,019 miles, automatic, 82 miles of the latter being in Canada. No manual block mileage was reported for Canada. The mileage of block signals under construction in the United States and Canada on the last of the year was 1,085 as compared with 477 for the end of the year previous. A total of 1163 miles of automatic block is proposed for the ensuing year, 110 miles of which is proposed for Canada. The number of interlocking plants built or rebuilt in 1923 was much greater than in 1922. During 1923, 152 plants were reported for the United States and 14 for Canada, as compared with 95 and 10 in 1922. The selection by the railroads of the type of train control to be installed under the Interstate Commerce Commission's order proceeded rapidly. About 208 miles were completed during 1923, 280 miles were under construction on the last of the year and 544 miles definitely proposed for 1924.

The extensive replacement of old iron line wire with copper and the rebuilding of poles occupied the major attention of railroad telephone and telegraph forces during 1923. Telephone train despatching apparatus was installed on 2,931.7 miles of road as compared with an extension of telegraph circuits for this purpose on 635.6 miles. The first figure is about 1,046 miles less than that for 1922. Telephone conversation and message circuits were installed on 5,869 miles, an increase of 4,042 miles over 1922.

Car and Locomotive Business Good

The locomotives ordered for service in the United States during 1923, totaled 1,984, approximately 600 less than the total of 2,600 reported for 1922. The same figures for 1921, 1920 and 1919 are respectively 239, 1,998 and 214. Canadian orders totaled 116 as compared with 68 in 1922, 35 in 1921 and 118 in 1920. The number of locomotives built for service in the United States during 1923 was 3,362, more than twice the total for 1922 and, with the exception of 1918, greater than any other year since 1913. The freight cars ordered during 1923 for service in the United States totaled 94,471 as compared with 180,154 ordered in 1922. The Canadian orders of cars ordered of either United States or Canadian builders for service in Canada totaled 8,685 as compared with 746 in 1922 and 12,406 in 1920. Export orders were conspicuous by their almost entire absence, only 396 cars having been ordered for foreign delivery during the year. The outstanding feature from a freight car standpoint was the production during 1923, the number completed for service in the United States reaching the total of 175,748 or nearly three times that for 1922 when 66,289 cars were produced. With the exception of 1913 when approximately 300 more cars were built, it is the largest total reported since 1907. Orders placed during the past year for passenger train cars were 2,214 or slightly less than the figure of 2,382 for 1922. The production of passenger cars for service in the United States was 1,507, or more than double the figure of 676 for 1922.

The Outlook for 1924

The consensus of opinion regarding the outlook for the year now opening, as expressed by 12 railway presidents, may be summarized as follows:

The railway traffic of 1924 will not differ widely in amount from that of 1923.

There may be wider fluctuations of traffic than in 1923, but there is no reason for believing the railways will have much difficulty in handling it.

If the managements of the railways are not interfered with by adverse legislation by Congress or adverse regulation in other forms, capital expenditures to improve and increase the capacity of the properties will be continued on a large scale.

The passage of adverse legislation by Congress, such as is advocated by radicals, would curtail the capital expenditures that otherwise would be made.

The Work in Prospect for 1924

The railways of the United States and Canada spent over $1,200,000,000 for additions and improvements to their properties in 1923. The indications are that they will spend an equal amount during the year now opening. This forecast is based upon the plans of 34 roads, with a combined mileage of more than 109,000, showing that the work which they have already authorized or definitely planned to undertake aggregates more than $350,000,000. In addition reports made to the Bureau of Railway Economics by other roads show that they have carried over work involving the expenditure of more than $230,000,000. This includes a number of large projects authorized late in 1923, such as the Natron cutoff of the Southern Pacific, involving an expenditure of approximately $18,000,000; the Louisville & Nashville second track program in eastern Kentucky and additional facilities of the Philadelphia & Reading near Philadelphia. An analysis of the expenditures contemplated indicates that more attention will be paid to improvements and additions to roadway facilities in 1924 than last year, nearly two-thirds of the appropriations made to date being for work of this character.

Among the larger budgets are those of the Santa Fe aggregating more than $70,000,000; the Pennsylvania with more than $50,000,000; the Illinois Central with over $45,000,000 and the Southern Pacific with more than $40,000,000. Nearly 300 miles of new lines have already been authorized and practically an equivalent amount of second track, in addition to a large number of improvements of a miscellaneous character.

IMPORTANT PROJECT IN KANSAS.—The Atchison, Topeka & Santa Fe is now completing a 49-mile line in southern Kansas known as the El Dorado cut-off, at a cost of over $4,000,000.

The Railways Suffer Heavy Losses Each Year by Fire

Study of Causes and Damage Done Suggests Need of More Vigilance by Maintenance Officers

THE RAILROADS in this country had over 9,200 fires in 1922, causing property losses exceeding $10,000,000, according to statistics presented at the tenth annual meeting of the Railway Fire Protection Association. It was equivalent to an average loss per month of $850,000, or to a loss of $27,900 per day.

The table below gives a classification of the fire losses with respect to the class of property damaged.

As will be seen from the report there were no less than 268 section house fires in 1922, resulting in a property loss of approximately $90,000. There were 124 pumphouse fires, resulting in a property loss exceeding $50,000. There were no less than 70 coaling station fires resulting in a loss exceeding $150,000, and as many as 800 bridge fires resulting in losses to property alone, exclusive of any loss arising from interruption of traffic, of $417,000.

Fire in the Dearborn Station, Chicago, December 21, 1922.

Numerous Causes Assigned

Numerous causes were assigned for these fires. Of the 9,200 fires accounted for, a total of 541, representing a loss of $661,188, was reported to have resulted from exposure to adjacent property; electric wiring was reported as the cause of 282 of the fires, representing a loss of $167,654; exposure to forest fires resulted in 60 fires and a loss of $86,934; lightning was the cause of 47 fires, with a loss of $2,077,014; sparks from locomotives igniting inflammable material or structures were reported to be the cause of 1,427 fires, representing a loss of $909,025; and hot coals from locomotives falling on bridges, etc., were reported to be the cause of 460 fires, with a loss of $165,662.

Tramps and tresspassers were definitely charged with having started 401 fires, with a loss of $351,484. A total of 120 fires, causing a loss of $131,624, were reported to have arisen from the careless burning of rubbish and material, while 63 fires, resulting in a loss of $78,73, arose from the ignition of gasoline, oils, etc., and 49 of the fires, reulting in a loss as high as $207,644, were traceable to matches.

Fire Losses in 1922 Classified

Property	Fires	Loss
Passenger and freight stations and contents	537	$ 841,005.38
Cotton platforms	53	20,441.16
Automobile platforms	0	1,281.02
Section houses	268	89,784.73
Miscellaneous station buildings	265	56,397.69
Hotels, eating houses and contents	80	66,926.02
Water stations, pump houses, etc	124	53,380.54
Oil Tanks and contents	10	21,039.27
Coaling stations	70	152,583.82
Elevators	8	1,902,341.89
Stock yards, pens, etc	53	47,662.02
Shop buildings and contents	1,521	1,064,815.17
Storehouse buildings and contents	59	78,259.35
Piers, bulkheads, wharves, etc	21	963,273.19
Bridges, trestles, etc	800	417,150.27
Rolling Equipment	3,870	2,630,892.77
Floating Equipment	14	94,003.58
Merchandise in transit	345	797,696.03
Cotton, lading liability	115	358,545.22
Cotton, spark liability	35	74,188.60
Miscellaneous	968	449,792.23
	9,216	$10,183,459.95

Fuel Oil on Water Not a Serious Fire Hazard

For several years the Fire Protection Association has conducted studies on the fire hazard to piers, docks, trestle bridges, etc., imposed by the presence of fuel oil on the water, such as encountered in navigable streams and in watercourses near oil wells. As a continuation of these studies, W. F. Steffens (N. Y. C.) described a series of experiments which were conducted in New York harbor under his supervision for the purpose of observing at first hand the degree of resistance to fire actually presented by oil on water under natural conditions The equipment used was a 4-ft. by 6-ft. bottomless box of galvanized iron which was supported in the water by timbers. Oil was poured on the area of water enclosed by the box to a depth of one-half inch. After six days of exposure a white-hot rod five feet long plunged into the enclosure failed to ignite the oil. Neither did the hot rod cause ignition when gradually immersed. The flame of a Hauck torch, such as is used for snow melting, was then applied to the surface at various angles but only with the result that the oil was blown away from the flame. A bundle of cotton waste saturated with gasoline was then placed in the enclosure and set on fire, but no better results were obtained until the flame of the torch was applied directly against the waste, when the oil ignited, producing a tarry substance which remained unburned. Tests were then conducted with fuel oil freshly applied, which, when mixed with gasoline, was found to ignite. From these observations and laboratory and field experience it was concluded that fuel oil in contact with water can be ignited only under special conditions and that a water-logged timber coated with such oil will not burn except under extreme conditions, as during a conflagration in the vicinity.

Oregon Short Line Standardizes Hose Couplings

It is much to the interests of railroads, according to the Fire Protection Association, to promote as far as possible the adoption of the national standard hose coup-

ling which is 2½-in. by 3 1-16-in. with 7½ threads to the inch. A summary of the data received from railroads shows that of 12,783, 2½-in. outlets and 16,181 sections of hose on the 35 railroads reporting, only three or four per cent are standard, while 81 to 83 per cent can be standardized by the use of standardizing tools. As a concrete example of the practicability of standardizing couplings, it is reported that the Oregon Short Line is now 100 per cent standardized with respect to hose couplings, this standardization having been carried out even in cities such as Salt Lake City, which are not yet standardized, where provision was for interchangeability of fire fighting equipment by supplying the city with adaptors.

Preventing Emergency Housing Fires

What is believed to be the first consideration given to the emergency housing problem from the standpoint of fire prevention is had in a paper presented before the Fire Protection Association by P. A. Bissell of John C. Paige & Co., Philadelphia. This paper embodies lessons afforded by the shop strike, when railroads were required to provide considerable emergency housing and embraces the subject from the selection of the buildings to their eventual disposition It is reproduced in abstract form as follows:

Every railroad is likely to find itself faced with the necessity of providing on short notice facilities for lodging and feeding or furnishing amusement for employees. Such features as haste in preparation, temporary character of the structure and the hazard of new and often undisciplined men demand that greater care be given to fire prevention and protection than under ordinary conditions. Due consideration should be given to proper location and equipment, to careful maintenance and the prompt removal of such facilities when normal conditions are resumed.

Location: Housing facilities should not be introduced in shop or terminal buildings. Temporary buildings should not be placed so as to expose valuable or essential structures. They should be located 100-ft. or more from all main buildings. Careful consideration should be given to the location of boarding cars and the mooring of housing barges or other floating equipment with relation to exposure and to access by fire department.

Construction: Efforts should be made in congested terminals to secure as slow burning a design as practicable. No temporary structures should exceed one story in height or 200-ft. in length. If 200-ft. or more in length, they should be subdivided into 100-ft. sections by partitions covered with metal or asbestos, with openings protected by metal doors. Careful consideration should be given to the provision of adequate exits. Blind attics or other concealed spaces, if unavoidable, should be partitioned at frequent intervals. Incombustible floors should be laid to as great an extent as possible in kitchen and toilet rooms. Chimneys should preferably be of brick while if metal stacks are used the woodwork should be protected. Only spark-resistive types of roofing should be used.

Heating: Steam from an outside source is preferable, but if coal stoves and hot water heaters are used they should be firmly set up at least three feet from any woodwork on a metal mat or brick base, either of which should extend out at least 24-in. in front to protect the floor from hot coals, ashes, etc. Oil stoves should be prohibited unless installed in safety cabinets. The woodwork exposed to stoves or smoke pipes should be carefully protected, pipes passing through woodwork or roofs being equipped with a ventilating collar one and one-half times the diameter of the pipe. Steam pipes near or through woodwork should be insulated and kept free from combustible material such as clothing, papers, etc. Consideration should be given to the advisability of installing screens over piping or radiators and where steam lines are present, reducing valves should be installed to keep the pressure as low as practicable.

Cooking Facilities: Ranges and deep kettles should be installed with adequate clear space for all woodwork or other combustible materials and should always have suitable hoods vented from the outside. Where hot fires are to be provided for, such facilities should be set on a fireproof floor or ventilated masonry base. Such a base should consist of one course of four-inch hollow terra cotta or two courses of brick or terra cotta, at least one of which shall be hollow and be laid to preserve a free circulation of air throughout the whole course. This base should have sheet metal on the top with sheet metal and asbestos underneath when laid over a wooden floor. Flues, ventilating fans, etc., where used, should be so installed as to permit frequent cleaning.

Lighting: Electric wiring should conform to the National Electric Code. When kerosene lamps are used they should be of the metal font type and be so securely fixed in position as to avoid swinging, upsetting or any mechanical injury. The deflectors should be placed where the ceiling or shelf is exposed and all lamp cleaning and filling should be done in an isolated structure. The use of paper shades or the attaching of cords to nails or piping should not be tolerated.

Regulations: Definite arrangements for daily cleaning and removal of rubbish should be made, with metal cans of the self-closing types provided in adequate number at proper intervals. All combustible rubbish should be burned in a substantial incinerator at least 50-ft. from any building or cars. Smoking should be forbidden in dormitories. If permitted in designated locations such as recreation rooms, these places should be inspected carefully by watchmen, cleaners or other attendants after the occupants have retired for the night or gone to work. Metal cuspidors should be provided. No inflammable cleaning fluids should be permitted or inflammable germicides used on the floors or walls. All spare bedding and straw should be kept in a separately locked room.

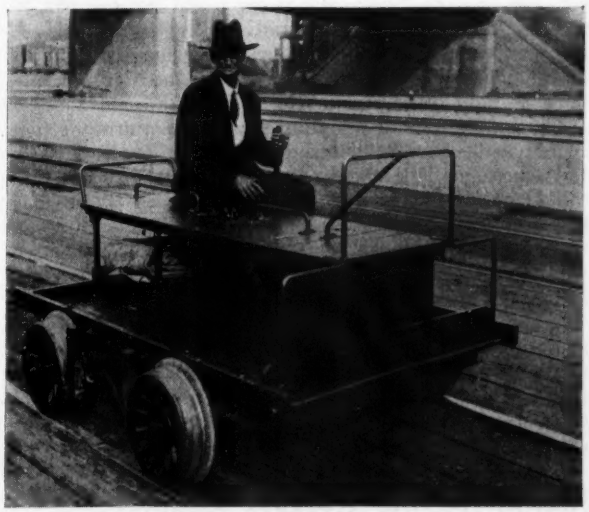
Fire Protection: Wherever possible all buildings should be located as to be readily accessible from hydrants and a clear roadway maintained for the approach of apparatus. If it is found necessary to extend watermains to provide for kitchen and toilet service, such extensions should be of a size sufficient to give adequate fire service and suitable hose hydrants and equipment provided. For outside protection where hydrants are not available, 40 gal. chemical extinguishers on wheels, together with pails, should be provided. For inside protection, one unit of first aid appliances should be installed for each 2,500 sq. ft. of floor space. Such a unit consists preferably of one approved 2½ gal. chemical extinguisher but five water pails or one cask and three pails constitute acceptable equivalents. Housing facilities should be constantly supervised by persons responsible for conditions. Watch-clock service should preferably be provided, also a fire alarm connection where the conditions warrant. It is suggested that gongs might be installed in dormitories as a safety feature and all guards or other special employees should be instructed in the location, use and care of fire appliances.

THE RAILROADS' INFLUENCE.—The report of Secretary Mellon to Congress states that the attitude and circumstances of the railroads will have an important influence on the prosperity of the country during 1924 and that the Transportation Act should not be altered now.

What Care Will Accomplish in Motor Car Operation

AN indication of the results which it is possible to secure from a motor car by the exercise of proper care, is afforded by the experience of two section foremen on the Missouri-Kansas-Texas. Neither of their cars has ever failed to start and to function properly nor have the gangs ever had to push either of the cars over the section or to walk in.

One of these cars has been operated continuously for more than 45 months by J. J. Broadhead, foreman at



Foreman J. J. Broadhead and the Car Which He Has Used for Forty-five Months

Tushka, Okla., without having required any repairs of any character. The original factory paint is still on the body and there is not a scratched place on it. The foreman covers the car when standing and he has never permitted ties or other heavy materials to be hauled directly on it. The care which the car receives is evidenced by the fact that before it is pushed into the toolhouse at night, each man is required to wipe a certain part of the car, the foreman himself caring for the more particular parts such as the feed line and the carburetor.

Foreman Blake's Car After Nine Years' Service Without Being in the Shop

The second car has been used by Sherman Blake, foreman at Canadian, Okla., for more than nine years and has also never been in the shop. While the condition of the platform shows that this car is used freely for the hauling of materials it is not abused. The foreman maintains it personally, finding that four or five minutes attention to it daily keeps it clean and in proper adjustment.

Roadway Signs Should Be Painted Regularly

By Charles K. Collenburg
Master Painter, Union Pacific, Cheyenne, Wyo.

ROADWAY signs are subjected to smoke and weather and require frequent painting to keep them in a presentable condition. To do this economically and efficiently is the problem that confronts the master painter and his superiors year after year. The class and style of the lettering adopted as a standard by the railroad has an important bearing on the cost and method of doing this work. It is also a matter of much moment, as far as the appearance of the sign is concerned, whether a stencilled sign with its usual cheap and incomplete finish will answer the purpose as well as the hand filled sign from traced or pounced patterns that do not display ragged or unfinished edges when done by an experienced man.

The difficulty in obtaining men who are able to do neat lettering in the various styles of the Roman alphabet has caused the almost universal adoption of the Gothic or block letter for all roadway signs. It has also lead to the easier method of stencilling black letters on a white ground instead of stencilling white letters on a black ground.

Sign boards should be attached to posts, buildings and bridges with bolts, lag screws, or screws, rather than nails and a uniform standard of size and location of holes for bolts and screws should be adopted, so that the signs may be easily removed without damage. If this practice is adopted the loss of time caused by inclement weather and the quite frequent defacement of work by inopportune showers can be eliminated to a great extent, as the men assigned to this work can be kept busy on a great part of their work under cover, in a freight house, work car or elsewhere.

When the best methods of repainting are considered from a practical and economical view point, the physical characteristics of the road must decide to a certain extent the necessary equipment that should be adequate to do the contemplated work. Where it is either impossible or inconvenient for the men to get their meals otherwise, it will be necessary to furnish a box car equipped with bunks, cook stove and other articles necessary to the material comfort of the men assigned to this work. Another car should be furnished for the storage of tools and materials, with sufficient space available to paint and letter such signs as are easily detached from buildings and structures. This outfit should be located at a point where the men can work from 10 to 15 miles in either direction.

Owing to the amount of material and equipment necessary on ordinary work of this description, a light weight motor car should be furnished for the use of two men assigned to this work, both of whom should be capable of doing any of the work that confronts them and both able to operate the motor car.

As all signs are usually discolored from engine smoke it is necessary to give them two coats of white paint.

This should consist of a mixture of 75 per cent white lead and 25 per cent zinc white, and the vehicle for mixing should be 85 per cent raw linseed oil and 15 per cent genuine turpentine. A small amount of good light colored Japan drier should be added when weather conditions demand it. Where the lettering is to be done by hand with lettering pencils two light coats of paint will not entirely cover the black lettering and they will be visible enough to follow their outline without re-pouncing. Where stencils are to be used or re-pouncing is necessary, a heavier mixture of paint should be applied so that old lettering does not show through the painted surface.

The men, when starting, should be supplied with sufficient material to paint the face and backs of all signs for the first coat and also for painting any switch targets, mail cranes, rail-rests, gates, cattle guards or other devices that are usually repainted on such occasions. They should be provided with the proper ladders and short plank and where the painting of poles adjacent to stations is part of the allotted work, the necessary belts and climbing spurs, not forgetting rubber hip boots where poles are quite often surrounded by water to a depth of two or more feet. This, with enough quarter-inch rope for emergency use on pole work, will load the car sufficiently to make it quite interesting for two men to get it off the track under ordinary conditions and far more hazardous in an emergency.

After the signs are properly coated in, and ready for lettering, the pounce patterns or stencils or both, carried in a fold to avoid either breakage or curling, should be added to the other necessary equipment and with the assorted lettering and stencilling brushes and lettering color, both men should be sufficiently supplied to keep them busy on the work.

If the work must be done in less time than a crew of two men can do it, four men can be assigned to the work by extending the mileage on each side of the outfit and using two crews of two men each, each crew with a motor car and necessary equipment; another man can be added to do the work around stations and in the immediate vicinity of the outfit location and such signs as can be readily removed and painted in the outfit work car.

The filing of daily reports and progress cards by each individual will show the progress on the work and enable the foreman to keep a close check on it daily without the necessity of continual surveillance over the men. Frequent visits by foreman so timed as to find the men at work and afford an inspection of work done is usually sufficient to insure both good and economical work.

The various classes of sign work on the large railroads requires the supervision of an experienced sign writer who has, in addition to his ability to handle a group of men, the necessary qualifications to design and execute any new sign required, whether in the standard style of lettering usually used or of something totally different. He should be able to detect at a glance any mistake in spelling or any error in the spacing or formation of the letters and, last but not least, he must have the necessary patience and ability to instruct the men under his direction in doing the work neatly and in a manner worthy of commendation.

The activity of safety organizations has resulted in adding many signs for the protection of the employees and the public, while the general use of motor vehicles on the highways has been instrumental in adding the many precautionary and danger signs that are now found necessary around railroad yards and crossings. At all large terminals, where machinery is constantly in use in the work shops, hundreds of signs of a precautionary nature are in evidence. Usually each railroad adopts its own plan or pattern for such signs, but a better and cheaper method would be the adoption of standards acceptable to all, so that they could be manufactured as stamped and enameled signs in large quantities and sold to the different railroads. The adoption of stamped and enameled signs, especially those of a precautionary or prohibitive nature, should be thoughtfully considered, as the amount of lettering usually found on such signs requires much time when done by hand, and their number is constantly increasing.

Enameled signs of a good quality are easily cleaned and should give good results when they can be used either inside of buildings or in the open air exposed to the elements. In considering the use of such signs thought must be given to the weight of the metal and the size of the sign, as the usual flimsy advertising signs that are seen on fences and billboards are not generally made to withstand the hard usage accorded to the signs on the railroad right of way or inside of shops.

The importance of adopting standard patterns of sign boards and styles of lettering cannot be overestimated, and where possible the size of new signs and lettering should be standardized to conform as nearly as possible to those already in use. Block lettering is advocated on account of its compactness and simplicity as compared with Roman letters, and because it can be read at greater distances than other types, if proper proportions are used.

Where wooden signboards are used, they should be made of clear pine, well smoothed and finished. To do the lettering on a rough board requires far more time than on a well dressed board and the better appearance of the sign repays the added expenditure necessary to give good results.

Signal Section Reports Against Use of Derails in Main Tracks

THE use of derails in main tracks was condemned by the Signal section of the American Railway Association through the unanimous adoption of a committee report presented at a meeting in New York on November 17. An abstract of this report follows:

Derails should not be used in main tracks.

On heavy grades, where the need of some device to check runaway trains or cars is indicated, properly designed deflecting tracks may be used.

Argument: Derails are required at grade crossings by law or public service commissions in ten states, most of which are located in the middle west. In several others, commissions order them at some points, being governed by local conditions. In the majority of states no derails are required. It is not the general practce of railroads to install main track derails at interlockings of their own lines. Non-interlocked grade crossings are not provided with derails. Derails are not installed at automatic or manual block signal locations, even on single track. Derails are seldom installed at the ends of double tracks. On railroads of three or more tracks, there is no safe place at which a derail may be located in the main track to insure against fouling other tracks when a derailment occurs. Even on a two-track railroad, this danger of fouling the opposite track, by reason of train buckling, when derailment occurs, is always present.

Accidents may not occur even if signals are overrun, but a derailment is certain if a train passes over an open derail; and even then a collision may result, and has, in several cases. In a few instances, the use of the derail actually caused a collision. Finally, the installation of a device to prevent an accident, by causing another which may be much worse, is illogical.

Maintenance Men Can Aid the Roads in Handling Traffic*

Suggestions Regarding Ways to Avoid Interference with the Movement of Trains on Busy Lines

BY E. T. HOWSON
Editor, Railway Engineering and Maintenance

DURING the first ten months of 1923 the railways of the United States broke all records for the amount of freight service they rendered the American public. Not only did they handle a traffic materially exceeding that of any previous period, but they did this without any large increase in facilities, and at the same time met practically all demands for service.

Prior to 1923 it had been commonly considered that the railways were working to their capacity when handling a traffic involving the loading of 1,000,000 cars per week. This figure had been exceeded only seven times in history and then only slightly, and those records were accompanied by large car shortages, congested terminals and widespread complaints regarding inadequacy of service. Furthermore, these million car records were established for single weeks only during the height of the fall grain movement and were not sustained.

Last year the traffic arose to million car proportions in the spring, and was maintained at this rate continuously for more than nine months, the only exceptions being those weeks in which holidays caused a curtailment in industrial operations. The previous high record of car loadings, 1,018,000, established in 1920, was exceeded repeatedly. In fact, the average loadings for the four months previous to October have exceeded the highest figure ever reached prior to 1923, the highest figure ever attained in history being established during the week ending September 29, when 1,097,274 cars were loaded.

The marked contrast between the conditions which prevailed in 1923 and those which existed in previous periods of similarly heavy business is not due to additions to the equipment. Neither is it due to any large additions to other physical facilities. It is true that the roads spent more than a billion dollars during the past year for improvements which would eliminate congestion and reduce delays at certain points, but the effect of these improvements on the capacity of the railways as a whole has been relatively small as yet, and one must look farther for the explanation of the records which were made.

The explanation of their performance is the fact that the railways used the existing plant more intensively than ever before was thought possible. I believe that this is indicative of the trend of the development which will characterize railway progress during the next decade. While I do not desire to minimize in the least the necessity for a continuous program of development to keep pace with the growing demands of traffic, I do believe that the increasingly strict regulation of the railroads and the limitations on the rate of return which now exist will cause the roads, and particularly those with less favorable earnings, to make expenditures for improvements more sparingly and that the railways as a whole will be forced to find new ways to increase the output of their plants by their more intensive utilization.

*Abstracted from a paper presented before the Pacific Railway Club, at San Francisco, Cal., on October 25.

The maintenance of way department is, from the very nature of its duties, brought into the most intimate contact with the transportation department, for many, and in fact most, of its operations affect the track and structures over which trains must pass. If congestion is to be avoided trains must be moved with little or no delay. On the other hand, as the number of trains increases, the inroads which traffic makes on the output of the maintenance forces affect the output and cost of this work very adversely. This calls for a careful analysis of methods and a close study of costs to determine that plan which will be most economical from all standpoints, and that department must be prepared to give way which loses the least, since all expenses must be paid from the one common purse. Present conditions are calling for the more thorough consideration of all methods affecting the movement of trains and it is possible that many methods of long standing in the conduct of maintenance work should be changed. It is to some of these methods that I desire to refer briefly.

Work Trains Are Expensive

The work train has long been a standard unit of equipment for maintenance of way operations. On some divisions trains are assigned to this service permanently while on others they are ordered for special work as required. Their use has been considered standard practice for so long that in many instances they are employed from force of habit even though the rising cost of wages and supplies and the increase in delays because of the heavier movement of revenue traffic have caused the cost of the work train service, measured in units of work done, to rise greatly. Also from a transportation standpoint every additional train on a line interferes with others and leads to congestion. It also requires locomotives and cars which would otherwise be available for revenue service.

The possibilities of the section motor car and trailer for the distribution of materials are being recognized to an increasing extent. It is becoming the common practice on a few roads to ship their ties out sufficiently in advance of their insertion in the track to enable their section forces to distribute them with their motor cars as they go over their sections daily and dispense with a work train for this purpose. The motor truck can also be utilized effectively in releasing work trains, especially in or adjacent to terminals. In a number of such localities the services of the work train have been dispensed with entirely while on at least one road motor trucks are utilized for the distribution of all materials other than rails and similarly heavy objects required by the maintenance of way forces on the line as well as in the terminals.

No operation performed by the maintenance of way department interferes more seriously with train movements or is interfered with more seriously by trains than the laying of rail. In the early days when there were few trains the delays were not serious, but on many roads

the traffic has now become so dense that it is impossible for a gang to make much progress and the cost of this work has risen greatly. Even with the most favorable grouping of trains, the productive time of the gangs is frequently reduced to less than 40 per cent of the time they are on the job. This condition not only increases the cost of the work, but it also causes it to be prolonged more than would otherwise be necessary.

To overcome these conditions the local transportation and maintenance of way officers on a few roads now cooperate in the development of a plan whereby the maintenance of way department is given the uninterrupted use of the track for all or the larger part of the working day, trains being moved in both directions over the remaining track, which is operated as a single track. While this adds to the complications of the transportation department temporarily in the movement of its trains over the particular section of the track on which the work is in progress and would appear to reduce rather than to add to the capacity of the line, it enables the maintenance of way forces to complete their work more rapidly, thereby not only reducing the cost but eliminating interference with the movement of trains more quickly, and in the end has been found to facilitate operation, for it has been the common experience of the roads on which this practice has been tried that the temporary handicaps are less serious than might be expected and being concentrated can be given added supervision so that they do not add materially to the cost of operation.

Watch the Slow Orders

Since every delay to trains reduces the capacity of a line to that extent, the causes of these delays should receive careful attention. Not a few of these delays are due to conditions under the control of maintenance of way officers. One of the most frequent is the use of slow orders. Such orders are, of course, necessary for the safe movement of trains and there are times when they are unavoidable. Under such circumstances constant attention should be given them to insure that they are not forgotten and that every reasonable effort is made to relieve the conditions giving rise to them at the earliest possible moment, in order that the speed limitations may be removed as soon as possible. A simple expedient to this end, which has been found valuable by one road, is the practice of requiring the chief dispatcher to furnish the division engineer and the roadmaster with a statement each morning showing the number and character of the slow orders outstanding on their respective territories. This statement serves as a constant reminder of the delays to which trains are subjected and as an incentive to the maintenance officers to remove them.

An investigation of the slow orders put out on almost any road will also show that a considerable number of them could have been avoided if proper precautions had been taken in advance. It is difficult, and in fact impossible, to anticipate all of the attacks to which a roadbed may be subjected, for the occasional flood or fire may strike at a point heretofore considered immune. However, many such conditions may be prevented by the adoption of adequate precautions. In other words, many of the so-called emergencies are not in reality emergencies at all, but are the result of failure to adopt reasonable precautions and can be eliminated by the substitution of a policy of *maintenance before* rather than *repair after*.

No condition interferes more seriously with the smooth operation of trains than derailments, not a few of which are due to defective condition of track. The first step in a campaign to reduce the number of derailments is the preparation of an analysis of the locations and conditions under which they are occurring. With this information it is frequently possible to detect the cause and to remove it with relatively little difficulty. Especially in a period such as this, when a delay to one train may cause serious delays to many others, it is important that close attention be given to this subject in order that all reasonable precautions may be taken to eliminate delays from this cause.

Scheduling the Work

At the present time when the heavy traffic is adding materially to the wear and tear of the track and structure, it is important that every effort be made to secure the maximum improvement from the money which is available for maintenance. A program is essential to the most successful prosecution of any activity, yet insofar as the routine work of maintenance is concerned little is done. It is here that, from the very nature of the duties, the danger of excessive loss of time is greatest. My attention was called recently to a division on which the local maintenance officer went over every section with their foremen at the beginning of the year's work and prepared a schedule of the work to be done during that year, divided by months. With this before him, each foreman had an objective toward which he worked so that there was no occasion for delay on his part in deciding what was the next job to be undertaken when one was finished. The improvement which was effected on this division by this simple expedient, and without the expenditure of a single additional dollar, was very marked and did much to bring the line into better physical condition.

Nor should attention be confined to the supervision of the smaller gangs for while the larger gangs are less numerous the possibilities for loss in such gangs are greater. Every minute lost by a gang of 60 men is equivalent to a man hour, and eight minutes to a man day. There are few gangs in which several man days are not lost daily by lack of adequate direction. This suggests the detailed study of gang organization. Such a study on one road recently led to the doubling of the output of a large rail laying gang and enabled it to complete its work and eliminate interference with traffic in half the time which would otherwise have been required.

Scenes on the B. and B. Convention Trip, Baltimore & Ohio Men in the Center

The Training of Foremen a Hard Task

Abstracts of a Number of Additional Contributions in the Contest on the Recruiting and Training of Section Foremen

WHEN a number of men discuss a subject with which they are entirely conversant it is to be expected that they will express many of the same general thoughts. This has been the case with the papers submitted in the contest on the training of section foremen, 12 of which were published in the November and December issues. However, there are decided differences of opinion and points of view and with the idea of giving our readers the benefit of the serious thought which our contributors have devoted to this subject we present below brief abstracts of a large number of additional papers received in this contest. In spite of the large amount of space which we have devoted to this subject it has been found necessary to withhold publication of a number of papers of considerable merit.

A Thorough Plan Is Necessary

By F. LISTON,
Canadian Pacific, Vandreuil, Quebec

To be a successful section foreman, one must master the basic principles of track construction and maintenance. Although this knowledge is the fundamental qualification, its value would be reduced to a minimum, if it were not linked with experience and a thorough training embodying such essentials as ability to handle men, judgment and foresight in the systematic planning and undertaking of work, giving precedence to the more essential items such as economy and care in the use of materials and tools.

As an initial inducement in the obtaining of labor of the required mental and physical ability, the standards of wages should be equivalent to those paid other classes of skilled labor. A secondary inducement and one that greatly influences the laboring world is the continuity of employment. A third and not frequently mentioned inducement is the pension system which offers financial assistance to faithful employees after a certain number of years employment, enabling them to spend their declining years in peace and happiness.

The educational standard of those employed should, if possible, be not lower than that of a complete grammer school education. The reason for this is the fact that the quality of track maintenance obtained will be directly proportionate to the brain power of the man in charge of it. Brain power as here used does not mean a large amount of academic lore, but rather a knowledge of the fundamental subjects of mathematics and mechanics and their application to the work being done.

A young man's apprenticeship or formative period begins with his employment. This is the most important point in his life as it is during this period that habits are formed which make or mar his future railroad career. It is during this period that his mind is most susceptible to influences within and without.

The earlier stages of a young man's development should be moulded under the watchful eye of a thrifty, industrious and capable section foreman. This is a period of strict discipline. Working under a shrewd and exacting master, the young man soon learns to be obedient to the rules and thorough in the performance of his duties. In time his zeal and ability will demonstrate whether he has an aptitude for this sort of work.

The section foreman should realize that there is nothing like a combination of work and study to straighten out the kinks and clear a young man's vision in the correct understanding of his work. He should therefore give his pupil an opportunity from time to time to supervise the work in hand. Opportunities such as these soon instill in him the confidence necessary to make use of his own initiative.

While outwardly developing the candidate in the art of track maintenance, the foreman should secretly instill within his subject the spirit of responsibility and loyalty. Maintenance of way forces are continually offering examples of their loyalty and faithfulness to their company and their superior officer in the performance of their duties thoroughly at all times and upon all occasions, whether under the immediate supervision of their superior officers or not.

After two or more years experience the young man should be given an opportunity to enlarge on the maintenance principles in which he has been thoroughly grounded by serving as an assistant foreman in an extra gang. This will give him an opportunity to acquire actual experience in the planning and carrying out of such work as lifting track, switch and rail renewals, putting in new sidings and track surfacing. To this may also be added the experience gained in the winter, in the handling of such snow fighting equipment as snow plows, flangers, ice cutters and spreaders.

During these latter periods of his training, he comes more directly in contact with the roadmaster and under his personal guidance develops as a first class foreman, a credit to his superiors and to the company for whom he works.

Adopt a Graduated Wage Rate

By E. E. BARTON
Roadmaster, Chicago & North Western, Pierre, S. D.

In discussing the question of choosing and training section foremen, let us not overlook the most important question, which is the selecting of good material to start with. We should do everything within reason to interest young men in track work. We find in checking over our section forces that we have mostly middle aged and older men of foreign birth and a few school boys working during their vacations who are not interested in the work.

I have favored the graduated wage scale for section foremen and laborers for some time and am satisfied that it would be of great assistance in building up our organization of section foremen. A first class machinist is not required to work for the same wage as a second or third class man, so why should a first class section foreman with a number of years of experience be compelled to work for the same rate of pay as a new man of little experience and ability and the same question must be raised with the laborers.

I would suggest that the foremen be divided into three classes, paying the first class $125 per month, the second class $110 per month and the third class $100 per month. The first class foremen should include those who have had three years' service as a foreman with a good record and be able to maintain first class track and handle all kinds of track and yard work. The second class should

include those having one year of service as foreman and who show willingness and ability and are what may be called good foremen. The third class will include new men with less than one year of service and who are not entitled to a higher classification. Division engineers and roadmasters or supervisors should classify their foremen once a year after a general inspection trip and base their ratings on ability and merit and have it understood that length of service does not necessarily change a foreman's classification.

Laborers should be placed in two classes with five cents per hour difference in rate of pay, the first class to include those who have had over six months of service and are able to do a good day's work, with the limit of four men on each section under this class. The second class should include all others, including new men. The rating of laborers should not be changed without permission from the roadmaster or supervisor. A plan similar to this would help greatly to restore the old time interest under which a foreman's greatest ambition was to be promoted to extra gang or yard foreman with the chance of some day being promoted to roadmaster or supervisor.

What One Road Is Doing

By Supervisor

The following plan has been tried with marked success. In fact, it has been the source of almost all of our new foremen in the past year.

In yards where there is considerable work to be done and assistant foremen are required, we have authorized positions as student foremen, the number being based on the size of the yard. These men are paid the same rate as the assistant foreman, which is 52 cents per hour. They are used as right-hand men for the foreman and are shown the way to do the work, taking positions as leading men when necessity arises.

The foreman gradually assigns them to do odd jobs here and there on their own responsibility and then they are promoted to assistant foreman and have a small gang of their own under the supervision of the yard foreman. In this way many odd jobs can be accomplished in the yard and at the same time these students are developing themselves to use their own judgment and initiative.

After serving as assistant foreman they are sent out as relief foreman for a few days or weeks at a time when a regular foreman has to lay off for sickness or other causes. A prospective candidate, of course, has to be able to read and write and in the judgment of the roadmaster have the appearance of good timber for a future section foreman.

Follow a Definite Plan

By F. M. Siefer,
Division Engineer, Southern Pacific, Stockton, Cal.

A track foreman must have the ability to follow instructions. He must be able to perform any work that is necessary for the safety of his tracks and work according to a program which is mapped out in advance. He must be able to supervise his men so that the work will be performed with the least amount of labor.

A qualified foreman must know how to maintain frogs and switches; he should know how to make adjustments and keep the switches safe for trains at all times. Several months experience in a steel gang or in a ballast gang as an assistant foreman will teach him how to organize men and to handle large projects.

Men should be transferred from the sections to yards when they show interest in the work and are, in the minds of their foreman and roadmaster, good timber for future foreman. Here they should be assigned to jobs that require a dependable man. Later they should be promoted to assistant foreman and given small gangs to develop confidence in themselves.

After they show considerable ability as assistant foremen, the roadmaster should send them out as relief foremen. When so employed the roadmaster must give them additional supervision so that when the occasion arises, they may be given sections of their own. Here their actual ability as foremen is tested and when they have proved that they can assume more responsibility, they may be picked for yard or other important sections.

Put the Men in a Special Gang

By M. Ganley,
Roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.

My idea of developing section foremen is to organize a student foreman gang of 10 to 20 men, according to the size of the division. The men should be employed as laborers for the first six months at the laborer's rate of pay, with an advance in wages for the second six months, another for the third six months and again for the fourth six months, finally getting the students' rate of pay for the last year. The final rate of pay should apply only to the last or the oldest five men in the gang, prorating the other rates of pay as among the other 15 men. These five oldest men should be used as relief foremen to take the place of foremen who are off for two or three days or even to replace section foremen who have not laid off but who are asked to stay away on full pay to give the students a chance. Some of the old foremen who never miss a day in the year should get some consideration this way.

The man in charge of the student foreman gang should be the best trackman that the division affords. This gang should be given a good camp outfit so it can be moved over the division to do all kinds of work which should be arranged in such a way as to give the five senior men who are in their last year ample opportunity to handle the gang while the foreman stands aside but keeps in close touch with what is going on. It is a hard matter to get a foreman who will do this for the young student as the average section foreman today is not inclined to teach the young fellow, but this can be overcome if proper inducement is offered.

Provide an Apprenticeship System

By Victor M. Loker,
Terminal Yard Foreman, Southern Pacific, Tracy, Cal.

My suggestion for the training of foremen is to organize a school on any or all track sections for young men with at least a common school education. They should be paid about five cents more per hour than laborers. After serving six months as apprentices the men should be transferred to other sections with another advance of five cents per hour and should be classed as student foremen. After serving six months as student foremen they should be placed in some yard or extra gang where they will be given the opportunity to see and do all kinds of important track work for a period of three months. They should then be promoted to assistant foremen of large extra gangs or assistant foremen in large yards for a period of six months at the standard pay for such positions. After service in the last named position they will be properly trained to take charge of a section gang.

Of course, it naturally follows that a great deal depends upon the man himself as to the length of time

necessary to qualify for such service. Again, it must be borne in mind that, in dealing with the kind of young men necessary to qualify along this line, great care must be exercised in the training by the one in charge, particularly in offering criticism during the course of instruction. No man is competent to handle a section gang until he has acquired a knowledge of the handling of tools. A mere knowledge of line and surface is not sufficient.

The Supervisor Must Use Tact

By J. W. McMANAMA

Track Supervisor, Boston & Maine, Waltham, Mass.

Candidates for the position of track foremen require two or three years' work on track to familiarize them with methods and practices and then a year as assistant foremen to demonstrate their ability to plan and handle men. The period a man serves as an assistant foreman should be spent on different sections of the road under the most competent foremen available. These foremen should be instructed by a supervisor or roadmaster as to the best methods of training their men, exercising tact and an attitude of encouragement to create an interest and bring out their best qualities. In my experience I believe that the men we find in the east require no special schooling or study. If a man is bright and follows the work carefully, he picks up knowledge automatically. The reading of some good railway journal will keep him in touch with new developments in connection with his work.

It is necessary to use care in selecting a promising young man and to avoid making any undue promises to him. He should go to work with the idea of fitting himself for promotion—not with the idea that the promotion will come automatically. I have seen many prospective foremen ruined by too rapid advancement.

How One Railroad Replaces Trestles With Corrugated Pipe

BY R. E. CAUDLE

Assistant Engineer of Structures, International-Great Northern, Palestine, Tex.

DURING the past two years the International-Great Northern, has replaced a number of timber trestles, vitrified and cast iron pipe drains, timber boxes and other types of culverts with Armco iron corrugated pipe. This form of construction was adopted as standard after a thorough study of the experience of several roads which have been obtaining good results for the past 18 years.

On one of these roads which have used this pipe in sizes ranging from 18 in. to 36 in. in diameter, No. 18 gage metal is used for the smaller and No. 16 gage for the larger sizes. These installations are reported as being in good condition, showing very little deterioration from rust and, judging from present appearances, will give 10 to 15 years longer service. As the corrugated iron pipe culverts which we are installing in sizes up to 48 in. diameter are made of No. 10 and 12 gage metal, we expect them to give much longer service than the lighter gages referred to above and because of their flexibility and an improved coupling arrangement, we expect to overcome the trouble from breakage and uncoupling which we have experienced with other kinds of culvert pipe.

The engineering work connected with the installation of the corrugated iron culvert consists chiefly in calculating the required area of waterway to care for the drainage with the usual factor of safety and in planning the concrete headwalls. The installation of the pipe is a simple matter and can be left in the hands of an intelligent foreman. The principal precautions to take in this connection are to give the pipe a firm, even bed and to see that the fill is well tamped about it up to about three-quarters of its vertical diameter. After the pipe has been covered sufficiently to protect it from the impact of larger stones or clods the remainder of the fill can be made by teams or by dumping from cars without any special care, although in the case of large culverts under very high embankments, it is well to do some further compacting over an area extending two or three feet on each side of the pipes.

We do not hesitate to employ twin or triple culverts, but we always see that they are not placed too close together and that the material of the fill between them is solidly packed. Personally, I prefer this method to the use of a single pipe of large diameter.

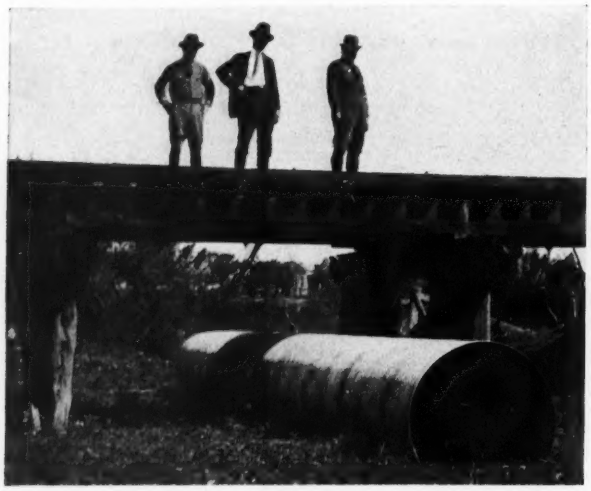
Two Major Advantages

Of the advantages possessed by this type of culvert two are of primary importance. The first is the ease with which it is transported and put in place. The pipes of different sizes are readily nested and less than one-third of the number of cars are required to bring them

Comparative Costs of Concrete, Cast Iron and Corrugated Culverts

Kind	Lines	Diameter	Length	Cost	Kind	Lines	Diameter	Length	Cost	Gage
Concrete	1	18 in.	32 ft.	$136	Corrugated Iron	1	18 in.	34 ft.	$ 93	12
Concrete	1	24 in.	24 ft.	137	Corrugated Iron	1	24 in.	28 ft.	101	12
Concrete	1	30 in.	32 ft.	248	Corrugated Iron	1	30 in.	30 ft.	130	12
Concrete	1	30 in.	32 ft.	232	Corrugated Iron	1	30 in.	30 ft.	146	12
Concrete	1	48 in.	88 ft.	1,361	Corrugated Iron	2	48 in.	80 ft.	1,745	10
Concrete	1	30 in.	32 ft.	261	Corrugated Iron	1	30 in.	32 ft.	146	12
Concrete	1	48 in.	40 ft.	522	Corrugated Iron	1	42 in.	48 ft.	378	12
Concrete	2	48 in.	40 ft.	983	Corrugated Iron	2	42 in.	34 ft.	586	10
Concrete	2	48 in.	56 ft.	1,388	Corrugated Iron	2	36 in.	60 ft.	689	10
Concrete	1	48 in.	32 ft.	376	Corrugated Iron	2	36 in.	32 ft.	362	12
Cast Iron	1	36 in.	54 ft.	497	Corrugated Iron	2	36 in.	50 ft.	538	12
Cast Iron	1	36 in.	48 ft.	451	Corrugated Iron	2	30 in.	48 ft.	355	12
Cast Iron	1	24 in.	24 ft.	166	Corrugated Iron	1	24 in.	24 ft.	98	12

to the job that are necessary for the heavier and more bulky construction. Also practically no handling tackle is required, the installing crews often consist of few men, and the use of work trains is reduced to a minimum and, in many instances, dispensed with entirely. In

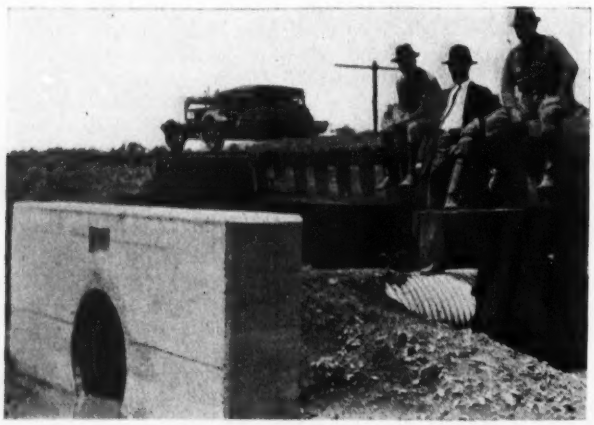


Many Trestles Have Been Replaced by Embankments and Corrugated Pipes

case of emergency a corrugated culvert and all of the tools required for its installation may be transported on a motor car or a hand car.

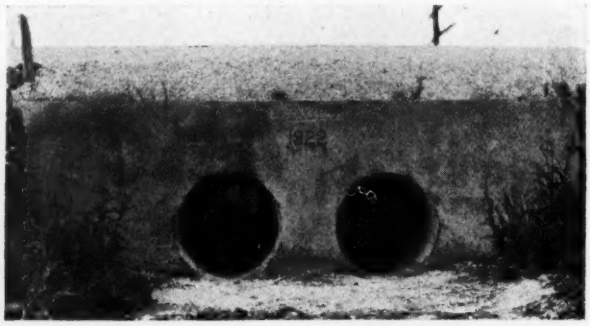
The second advantage is the ability of the pipe to withstand the strains that may come from uneven settlement of the fills. Normally new fills settle more near the center than elsewhere and this tests any type of culvert structure severely. With corrugated pipe we do not worry about this as there seems to be enough flexibility to take care of it.

The use of corrugated pipe has enabled us to do away with timber trestles, which in many instances, are several



Example of Concrete Headwall Provided for the Corrugated Pipe Culverts

times as expensive to erect and maintain. On the line from San Marcos to Laredo we replaced 616 lin. ft. of pile trestle (44 panels), which would have cost $13,936 to renew in kind with corrugated pipes effecting an initial saving of $5,000. The tabulated statement shows the cost of corrugated iron culverts in comparison with those of concrete and cast iron as taken from the roadway completion reports from July 1, 1921, to June 30, 1923. The figures given include the cost of pipe f. o. b. factory, the cost of labor placing, the use of tools, transportation of material and rental of equipment. No costs are shown for concrete parapet walls or the filling of the structures, as this would be approximately the same per cubic yard for all classes of culverts. Concrete in place averaged $11.50 per cu. yd. and earth embankment 25 cents per cu. yd. The



Two Lines of 30-in. Pipe

removal of the old trestle averaged 80 cents and the cost of replacing bridge ties with track ties averaged approximately $1 per lin. ft.

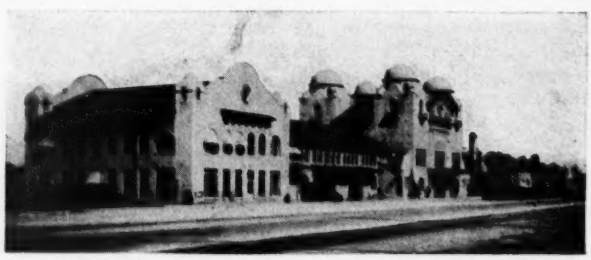
In 1922, 25 pile trestles, with an aggregate length of 1,188 lin. ft., were replaced with corrugated iron pipe culverts with concrete parapet walls. The estimated cost to renew these trestles was $24,952. The following corrugated iron pipe of No. 12 gage was installed:

Diameter	18 in.	24 in.	30 in.	36 in.
Lineal feet	94 ft.	242 ft.	306 ft.	572 ft.
Cost of pipe in place				$ 5,818
Concrete parapet walls in place				3,380
Earth embankment				3,105
Removing old structures				1,163
Track ties and miscellaneous				1,600
Total cost				$15,066

Our program for 1923 called for the replacement of 32 trestles, with a combined length of 920 lin. ft. and an estimated cost to renew in kind of $21,252. The following corrugated iron pipe of No. 10 and 12 gage was installed:

Diameter	18 in.	24 in.	30 in.	36 in.	42 in.
Lineal feet	220 ft.	200 ft.	274 ft.	446 ft.	154 ft.
Cost of pipe in place					$ 5,655
Concrete in parapet walls					3,648
Earth embankment					2,700
Removing old trestles					690
Track ties and miscellaneous					1,100
Total estimated cost					$13,793

The program anticipated for the next several years will be approximately the same as for 1922 and 1923.



Concrete Station of the Atchison, Topeka & Santa Fe at San Bernardino, Cal.

Putting New Life Into a Maintenance Organization

By Charles Weiss

THE AVERAGE maintenance organization is distinguished by the permanent character of its personnel. The supervisors or roadmasters as well as the foremen have usually reached their positions as the result of a long grind and are satisfied to make it their life work. Resignations are few and far between, dismissals from the service even more rare and the average span of life of the men engaged in such a healthy, albeit strenuous, occupation is so long that even deaths are seldom.

This unchanging feature is at once the strength and weakness of the organization. It is the former because those in charge of the upkeep of the property are familiar with its peculiarities, and the latter because immobility of personnel is a weakness, for although the personnel may function harmoniously it probably does not do so most energetically or efficiently. The man who has spent most of his experience on one job or in one place lacks the breadth of vision common to the one who has labored under different conditions. In plain words, he is in a rut.

A Transfer May Wake Him Up

One railroad officer was heard to state that when a man is satisfied with his job, it is time to transfer him. Years of experience had shown him that after a certain period of time most men get into a rut and it is necessary to put them in some other position to make them perform again to the best of their latent ability. Needless to state, different men are satisfied with different conditions and the statement referred to must, of course, be modified accordingly.

It is, of course, true that section foremen work on other than their own sections at times. As a rule, however, such work is done under emergency conditions and they are assigned as units to one particular task. At such times a foreman may pick up some new points by careful observation, but he will not be jarred very much out of his rut. Supervisors and those of even higher rank are affected likewise, notwithstanding their broader professional contact and their greater attention to technical literature and new developments. The majority after a number of years' service on the same sub-division have a tendency to become less energetic or, at least, less progressive. Some continue to remain on the constant lookout for any possible improvement, but they have become so accustomed to seeing the same panorama that their perspective has become less acute. They are then unable to distinguish details that would be much more obvious to a new man. It is not a reflection upon the individual, but rather a natural peculiarity of the human mind, for the same persons moved to another point will almost invariably display a new lease of life and show many points of improvement over their predecessors.

How, then, should the vitality of a track organization be kept strong and its energy undiminished? The first thought will be to keep moving the roadmasters and foremen to other jobs. This is, however, not advisable, for constant shakeup of those directing the work is likely to disrupt and partly demoralize the organization. How, then, can the desired result be accomplished? In the first place, a reasonable amount of change in the roster is possible due to departures from the organization by promotion, resignation, retirement, death and dismissal. To make the most of every such vacancy, another man of the same rank should be secured to try for the job, in preference to giving it to a newly promoted man. In other words, if there is an opening for a section foreman, an attempt should be made to get another foreman who is known to be in a rut to take the job.

Keep a Record of "Local Characteristics"

Many officers do not approve of the transfer of the foremen who have been on one job for any length of time if it can possibly be avoided. They consider such a man's knowledge of the local characteristics worth more than any increased interest he may show on a new job. Such knowledge is indeed valuable and it must be admitted that very often all such information is in the back of one man's head. There is no actual record of it to be had. It is such a simple matter to keep data of this nature recorded, thus making the property independent of any one man's experience, that every supervisor's office should have an accurate, up-to-date "local characteristic book." Any substantial note book like a field book with a few pages for each section will be satisfactory. The supervisor or some subordinate can then gather all the information by walking over each section with the foreman. He puts down each item with approximate location so that everything entered in the entire book is in geographical order. A sample page might look as follows:

M. P. 14 + 500 — M. P. 14 + 1300	Sink in track which appears after high water subsides, due to sliding strata under tracks.
M. P. 14 + 3900 — M. P. 15 + 300	Peterson Curve, forced away from hill by gradual movement, must be relined at least once a month.
M. P. 16 + 250 — M. P. 16 + 1900	Barkers Knoll, watch for falling rocks.
M. P. 16 + 1700 — M. P. 16 + 2600	Soft place, sinks in rain, heaves in winter.
M. P. 17 + 900 — M. P. 17 + 3200	Williams Cut, watch for snow drifts.
M. P. 18 + 450 — M. P. 18 + 2000	Jones Curve, gage requires frequent attention.

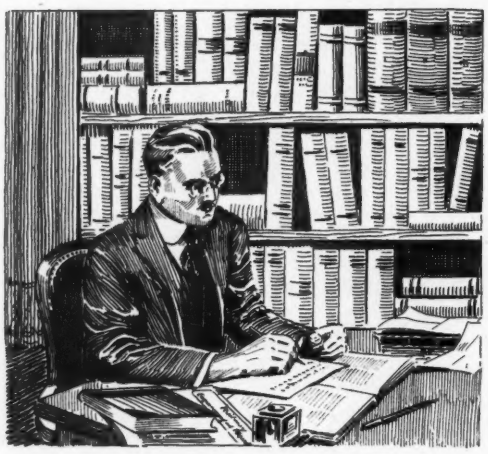
Space should be left after each item for possible future additions. The supervisor may have notations of his own to include. Very few changes would have to be made in a year's time, and the brief, simple information contained would be an inestimable help either for a new foreman or for a new supervisor. It renders the right of way less of a personal matter and makes it possible for anyone to step in and not have to worry about any hidden, unknown quantities.

Meetings Will Help

In addition to changing the personnel gradually, morale may be maintained in other ways. Meetings are a common feature on many railroads. They are often unproductive of any benefit and are unpopular, largely because they are too dry. The chairman reads certain reports, letters and notes, but few questions are asked and no discussion is held. The injection of a round table discussion on the details of the work will serve as a greater stimulus. Certain subjects may be announced for several weeks in advance. Lectures and moving pictures dealing with track work or other phases of railroading are also a great help. The passing on to the foreman of new developments should be made a regular practice.

Getting into a rut is only a matter of time. Some men get in sooner than others, some get in deeper and some get out quicker. The tendency, however, is a natural one for any human being under the conditions imposed by track organization, and it is therefore necessary to apply counteracting forces.

What's the Answer



This department is an open forum for the discussion of practical problems of maintenance of way and structures. Readers are urged to send in any questions which arise in their work in the maintenance of tracks, bridges, buildings and water service. The *Railway Maintenance Engineer* also solicits the co-operation of its readers in answering the questions listed below.

These questions will be answered in the March issue:

(1) To what extent is it practicable to require foremen to turn in old tools in exchange when requesting new ones?

(2) What is the maximum amount of shimming which may safely be done when surfacing trestle bridges?

(3) What is the best design for a floating intake in roadside or settling tanks where it is desired to draw off the water from the top?

(4) How large a stock of parts and supplies for a motor car should be carried by a foreman?

(5) What is the minimum distance that reinforcement should be placed from the surface of concrete to prevent corrosion?

(6) What precautions should be observed when removing track shims as the frost leaves the ground in the spring?

(7) What are the relative merits of the several patterns to which brick is laid in platforms?

(8) What advantages, if any, are to be gained by using larger or longer ties at soft spots?

Loosening Track Bolts in Winter

Should the joint bolts in track be loosened temporarily upon the approach of extreme cold weather to allow for contraction of the rails?

First Answer

The maintaining of the joint bolts plays a very important part in the life of the rails. They should be kept tight at all times and only loosened in emergencies. If the expansion is uniformly maintained the rail will adjust itself. If on the other hand the bolts are loosened and traffic is heavy the expansion will be lost and kinks will develop, joints will batter and the life of the rail will be shortened. G. E. STEWART,
Assistant Engineer, Southern Pacific, Stockton, Cal.

Second Answer

It is not necessary to loosen bolts with the approach of extreme cold weather. If the rail ends and angle bars are painted with a good coat of crude oil at the time the steel is laid and the bolts kept tight thereafter, using an improved nut lock, the contraction and expansion will adjust itself. I have spent many winters in the northwest where the weather gets down to 40 deg. below zero at times but have never experienced any trouble in this respect. A tight joint is the most essential requirement for good riding track and protects and increases the life of the rail. R. J. O'CONNOR,
Roadmaster, Chicago, Milwaukee & St. Paul, Savanna, Ill.

Third Answer

My experience as a foreman for over 20 years in Manitoba, where the weather goes to both extremes and where I have seen a great deal of rail laid in both summer and winter, is that expansion and contraction will take place no matter how tight the joint bolts are. I was reminded of this only last November when a lead track was laid with 80 lb. steel. Throughout the day the temperature was about 40 deg. above zero. Allowing about 1/16 in. expansion, ⅞-in. by 5-in. bolts with washers were applied and tightened to the full amount. During the night the temperature would fall to 20 deg. and I took particular notice that contraction to the amount of nearly ⅛ in. occurred at nearly every joint. G. H. MANSON,
Yard Foreman, Canadian Pacific, Brandon, Man.

Fourth Answer

Instances have come to my attention where track with sufficient expansion has showed signs of kinking in hot weather, the defect being remedied by loosening the bolts; also of track joints being pulled apart by cold weather. It is evident from this that trackmen should inspect the track closely during extremes of climatic conditions and be prepared to loosen the strained joints. I would not advise any general loosening of track bolts over a territory in either hot or cold weather. Such emergencies as mentioned can be minimized, first, by oiling the track bolts and nuts when applying them and periodically thereafter, and second, by careful daily maintenance where trouble of this character is likely to occur. Anything done toward this end may be considered of ultimate economy and a factor of safety. E. R. LEWIS,
Office Engineer, Michigan Central, Detroit, Mich.

Fifth Answer

My experience in territories where extreme cold weather prevails during the winter months is that where track is maintained in first class shape with the expansion uniformly distributed, with all the joints equally tight and with all spikes driven down, there is no necessity for loosening the bolts on the joints. The fact that some joints do not allow contraction as freely as others can be attributed to other causes, such as occur where joints are not kept tight at all times, where the joints were

applied improperly when the steel was laid or where one side of the track is allowed to creep, resulting in the slewing of the joint ties to such an extent that the bolts become skewed in the joint, thereby taking up the space in the holes of the rail allowed for contraction. If the joints are properly maintained the contraction will take care of itself. Loosening of the bolts for the winter is a practice of former days when different standards were maintained and does more harm than good where the practice is continued.

FRED A. ELESCKE,
Section Foreman, Southern Pacific, Oakland, Cal.

Test Holes for Wells

In developing ground water supplies, should the test holes be made the same size as the proposed wells, and if not, how is the flow obtainable from the proposed wells to be estimated from that obtained from the test wells?

In developing a ground water supply in an unproven territory, it is advisable to make preliminary investigations of the probable yield and quality of water by means of small test holes, before proceeding with the installation of proposed well. In shallow wells, a number of small diameter test holes may be put down at a relatively small cost, and the underlying formations determined with considerable accuracy. In deep wells, a single test hole is usually constructed and if the indications are favorable, the test hole may then be utilized in the completion of the finished well.

The ground water level or water table, the thickness and nature of the water bearing formation and the strata above and below that might affect the yield of the well, are the most important features developed by the test hole. The probable yield of the formation can be predicted fairly accurately from this information without an actual pumping test, taking into consideration the type of well proposed and the conditions of pumping. A pumping test on a small test hole is of little importance for the reason that the test hole is not usually completed in such a manner that its yield is comparable to that of the finished well.

W. M. NEPTUNE,
Principal Assistant Engineer, Missouri Pacific, St. Louis, Mo.

Steam Pipes vs. Radiators for Heating Buildings

What are the advantages, if any, of using pipe coils in preference to cast radiator units for heating railway buildings?

The question is a difficult one to answer for conditions have changed from what they were a number of years ago as regards the use of radiators and pipe coils. In general, I would say there is little real advantage in favor of one over the other, except that of pressure rating. Most cast iron radiators are built for comparatively low pressure service and occasion arises quite often in railway buildings to use higher pressures than can be used safely with cast iron radiators as ordinarily built. In such cases pipe coils are of advantage, for they can be built to withstand any pressure encountered in the usual railroad power plants.

There is another advantage in the use of pipe coils in railroad buildings where it is desirable to spread the heating service over a considerable portion of the wall or skylight surface, since this can best be taken care of by the use of pipe coils as pipe coils are not as compact as cast iron radiators. Another advantage which might be claimed for pipe coils is that they are less liable to breakage than cast iron radiators, which is a noteworthy point in a roundhouse or machine shop.

As far as utility and the question of proper circulation are concerned one has no advantage over the other. The removal of air from the system, however, is more easily accomplished with cast iron radiation. Also, with labor and material charges as at present the cost of building pipe coils will make the cost per square foot of radiation greater than the cost per square foot of cast iron radiation.

F. C. BRADBURY,
Manager, Specialty Department, Crane Co., Chicago.

The Place to Straighten Track Spikes

Is it advisable to have bent track spikes straightened by the section forces instead of sending them to a reclamation plant?

First Answer

Bent track spikes should be sent to a reclamation plant for straightening as the safest and most efficient way of doing this work. In the plant they are heated and then straightened by machine, where section forces must straighten them cold, causing the spikes to break.

D. DEPINTO,
Track Foreman, Great Northern, Rexford, Mont.

Second Answer

Most bent serviceable spikes can be straightened either on the job or in the tool house on rainy days. Those that are badly bent should be sent to a reclamation plant.

F. A. ELESCKE,
Section Foreman, Southern Pacific, Oakland, Cal.

Third Answer

Where a large number of spikes have been released on account of rail relaying or where a track is taken up, the spikes should be sent to a reclamation plant. On the other hand, the sorting and straightening of bent spikes released by the section gangs makes a good rainy day job for the section men at the tool house.

W. A. RODERICK,
Assistant Engineer, Wheeling & Lake Erie, Brewster, Ohio.

Fourth Answer

Out on the road is no place to straighten track spikes. Section forces are not equipped for it. A reclamation plant is equipped for this class of work and can straighten ten kegs of spikes while one is straightened by hand by the section forces.

R. K. GRAHAM,
General Superintendent, Reclamation Plant, Atchison, Topeka & Santa Fe, Corwith, Ill.

Fifth Answer

Probably 75 per cent of the bent spikes picked up along the track can be reclaimed by the section forces. About 25 per cent of them are bent back and can be straightened on top of the rail as they are being used, while 50 per cent are bent to one side. These can be straightened by driving them part way into soft side track ties and then straightening with a hammer. The remainder, which are bent forward or toward the nose of the spike, cannot be straightened in this manner. They cannot be driven into ties on account of the rail being in the way and if laid on top of the rail are liable to slip when struck and cause injury. They should either be sent to a reclamation plant or put on the scrap pile.

A. BOLOGNESE,
Section Foreman, Philadelphia & Reading, Royersford, Pa.

Sixth Answer

I do not consider it economical to send bent and other second hand or scrap spikes to a reclamation plant. I make it a practice to have each foreman sort out all straight usable spikes which he picks up or recovers each day for further use on his section. The balance are picked up monthly or when the scrap cars are run over

the district, are loaded separately from other scrap and are unloaded at the terminal where they are picked over by an experienced track man and straightened by the use of a mechanical straightener. The straightened spikes are used on yard tracks.

By handling the work in this way we can make a closer inspection. An experienced track man is a better judge of a spike, as he has to use it, while men at the reclamation plant are perhaps better judges of general scrap. A further advantage of this practice is that it saves shipping spikes to a reclamation plant and then shipping them back to the division.

R. J. O'CONNOR,
Roadmaster, Chicago, Milwaukee & St. Paul, Savanna, Ill.

Portable Phones for Bridge Gangs

Is the use of portable telephones by bridge gangs to be recommended?

First Answer

The use of portable telephones by bridge gangs is highly recommended. Each gang should be equipped with one so that closer touch can be maintained with the movement of trains and a saving in labor costs obtained. The Southern Pacific's policy is to equip all bridge and extra gangs with portable telephones so as to increase safety and reduce delays to a minimum.

G. E. STEWART,
Assistant Engineer, Southern Pacific, Stockton, Cal.

Second Answer

The advisability of equipping bridge gangs with portable telephones depends upon the local conditions on the railroad in question. I am unalterably opposed to bridge gangs, yardmasters, agents or train crews cutting in with portable telephones on a train dispatcher's wire, particularly on a busy piece of single track. A train dispatcher ordinarily has all he can attend to in handling his trains without this outside interference and to remove the restriction for one group of men is to do it for all.

If there is a message wire in connection with the telephone train dispatching which acts as a block wire between operators, I see no objection to the practice; in fact I favor it.

In a recent installation of telephone train dispatching on one of the heaviest pieces of single track in the United States, the question came up of cutting in the yardmasters and agents and even some of the minor officials at important points and I took the position that the pre-eminent duty of the train dispatcher required his attention to the handling of trains and he could not afford to be interrupted with by outside interference.

D. E. STEVENS,
General Superintendent, Baltimore & Ohio, Cleveland, Ohio.

Third Answer

One who has never used a portable telephone in connection with railway construction work might not think very favorably of the suggestion, but any person who has had the opportunity of using one in connection with his work would find himself badly handicapped without it. It is our belief on the Pere Marquette that each bridge and extra track gang should be equipped with a portable telephone at all times, no matter how near or far it may be working from a station. They are time savers and time is money.

With a portable phone it is an easy matter for a foreman to get in touch with the dispatcher and keep himself informed as to the movements of all extra trains as well as to delays to regular trains. By so doing he is able to plan his work accordingly and have the bridge or track ready upon the arrival of the next train, thereby causing it the least possible delay. Also, in case he is not able to finish a certain part of the work in the time available he usually has other work that can be done to fill in this time, if he is fully advised, where otherwise he might be kept waiting for some time, expecting at any moment to see the train approaching.

They may also be considered a factor of safety since the foreman need take no chances in trying to do just a little more than he has time for.

J. P. WOOD,
Supervisor, Bridges and Building, Pere Marquette, Saginaw, Mich.

Fourth Answer

On all lines where train dispatching is done by telephone, bridge crews should be provided with portable telephones so that the foreman in charge may keep in touch with the division headquarters at all times and be enabled to know the exact location of trains before starting work on bridges.

There are many places where agents are not on duty at all times and the foremen cannot get information through agents when they want it. In addition to this many jobs are remote from stations necessitating sending a man long distances to get information about trains. By avoiding this the portable telephone will save money and time and result in greater service and efficiency. As the telephone will be in charge of the foreman of the crew, the use of such equipment will not be abused.

A. I. GAUTHIER,
Supervisor Bridges and Buildings, Boston & Maine, Concord, N. H.

Portable Saws for B. & B. Gangs

Are portable saws of practical value to bridge and building gangs?

In discussing the practicability of portable power saws for bridge and building gangs the reader's attention is directed to statements in the *Maintenance of Way Cyclopedia* and to a recent report of the American Railway Bridge & Building Association. The Cyclopedia has the following to say: "Employed judiciously in connection with the repairing or renewing of structures and on the smaller platform of crossing jobs, as well as the construction of stock yards, tunnels, culverts, bridges and buildings, suitable machines often provide a means of greatly reducing costs, of getting satisfactory results with short-handed crews, of releasing a crew more quickly for other pressing work or of speeding up emergency work." The conclusions of the American Railway Bridge & Building Association are found in a report on labor saving devices submitted last year by a committee of which J. S. Huntoon, assistant bridge engineer, Michigan Central, was chairman. They read as follows: "Portable circular saws are good labor savers when sufficient work of one kind is to be done. For form work it is plain that they save as high as 25 per cent of the cost. It has been suggested that these saws could be used to cut old bridge timber into smaller sizes and in the reclaiming of considerable old material."

While the above statements are general in character they indicate the possibilities of such equipment and point out some of the factors which must be considered where its use by bridge and building gangs is under consideration. If the conclusions are faulty in any particular it is in the ultra-conservative character of the report of the Bridge and Building Association. This undoubtedly arises from the lack of experience which some roads have as yet had with power saws elsewhere than in permanent locations. This lack of experience in turn is partly to be explained by the practice followed on some roads of doing practically all building work, other than routine

repair, by contract or of building all bridges from material framed at central points. The latter, for instance, is the practice on the Rock Island line which uses creosoted lumber. In such cases it is seldom that power saws would be of service to gangs on the line.

On the other hand, where considerable work is regularly done by floating gangs, portable power saws have proved decidedly practicable. On the Chicago, Burlington & Quincy, for instance, portable power saws were employed by the building department when erecting two icehouses this year. At the present time the bridge department of the same road has in service four such saws. On track elevation work at Aurora, Ill., these saws proved very economical, being used principally in building form work for several concrete street crossings. The saws were also used in subway construction work at Galesburg, Ill., and St. Joseph, Mo., and in building forms and in framing a 120 ft. tunnel recently completed on that road A special advantage of the portable saws on this work, aside from those mentioned, is in the means afforded of cutting the form lumber from second-hand bridge material on the ground, the saws serving both to rip and cut the timber crosswise.

The conclusions to be drawn from the experiences of the Burlington and other roads which are using portable saws, disclose the importance, however, of restricting the operation of the saw to one man in order to insure the proper care of the equipment and to prevent accidents arising from their operations by inexperienced or careless workmen.

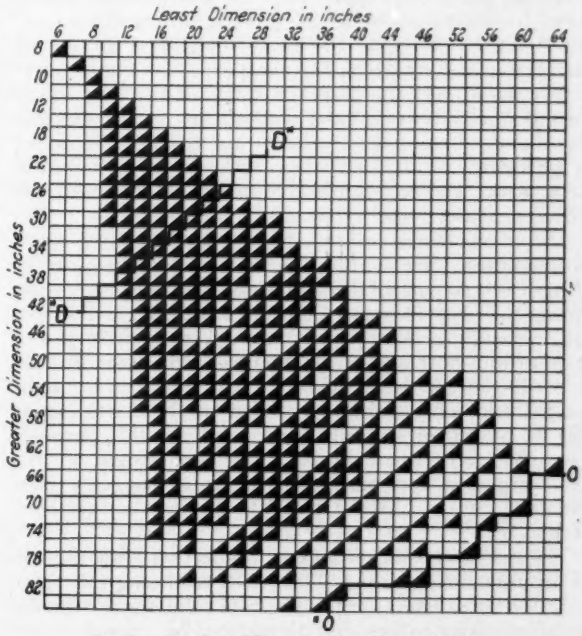
Glass for Railway Buildings

What are the relative merits of factory ribbed, wire and the several thicknesses and classes of plain glass for railway buildings?

Plain glass or what is more commonly called clear glass ordinarily is of two kinds, single strength and double strength, this classification having reference to the thickness. With respect to grade, this glass is usually classified as A-A quality, A quality, and B quality, depending upon the relative transparencies, freedom from flaws and stability under exposure to the weather. Since railroads are accustomed to carry in stock only one grade of such glass for the average use, this is a feature which is ordinarily of little consequence to the user unless, of course, the glass furnished is found to be unusually fragile, resulting in excessive breakage or necessitating the use of double strength in place of single strength, or where glass is unusually dull, causes excessive distortion of objects seen through it, etc. In such cases the question of grade may well be raised, preferably through the architect.

On the larger roads the use of single strength and double strength glass is usually regulated by a standard prepared for the guidance of designers, master carpenters, etc. Where several grades of the glass are carried this feature is also covered by instructions. These standards generally tell what dimensions of glass are kept in stock and distinguish between the buildings using the different grades and thicknesses. The size of the sash to be fitted with glass usually determines whether single or double strength glass of any one grade should be used. On the Chicago, Milwaukee & St. Paul, for instance, a blue print is prepared, as shown in the illustration. The marked areas on this blue print show the sizes of the glass carried in stock. All stock sizes above the line DD are single strength, while all sizes between the line OO and the line DD are double strength. On this road quality AA glass is specified for the best work, such as ticket offices and signal tower windows where clearness is essential; quality A glass for all ordinary purposes, such as depot waiting rooms, dwelling section houses, telegraph offices and scale houses, and quality B for rough or temporary work in bunkhouses, freight rooms, boiler, coal and oil houses.

Factory ribbed and wire glass fall into the plate glass division as distinguished from the glass mentioned, which is a blown glass. Having woven wire embedded in it and at the same time being transparent, the wire glass is adapted for doors or sash where a clear view is desired but where, at the same time, protection should be provided against fire or the shattering of the glass from blows. Factory ribbed glass is a special type of maze



An Instruction Chart in the Use of Glass

glass, that is, a glass which will transmit light but will obstruct vision. The distinguishing feature of this ribbed glass is its ribbed or corrugated form which has the effect of increasing the reflecting capacity of the glass. For this reason it is useful in skylights, etc., where it is desired to avoid the sharp rays of sunlight and at the same time to reflect the light inwardly. A better glass for this purpose is prism glass, which is a clear glass in which the ribs are prism shape, but this is usually limited in use by reason of its greater cost. Ordinary maze glass is useful on interior doors, partitions, etc.

The Remedy for Fish in Reservoirs

Is there any remedy for trouble from fish in water supply reservoirs aside from a screen covered intake? Can the water be treated to kill them without rendering it unfit for boiler use?

One method which has been employed to escape trouble from fish in water supply reservoirs, aside from the screen covered intake, is to pour kerosene over the area within the intake. The effect of this oil on the fish is evidently the indirect one of preventing the oxygen necessary to fish life from entering the water. At any rate, the application of the oil is attended by an accumulation of dead fish on the surface, which may then be skimmed off. This method is only partially effective, however, and is too costly and bothersome a procedure

to be recommended. Dynamiting is effective in killing fish but is hardly to be recommended for removing the fish from the water completely.

Of all the methods resorted to for killing fish, the application of a solution of copper sulphate (blue vitriol) is probably the most practical. This chemical is regularly used for removing vegetable life from ponds and has proven equally effective in destroying fish life. An example of its use exclusively for this purpose is had in the account of a program undertaken to destroy fish in Lake Wapanacki, Vt., in 1916, preparatory to restocking the lake with trout. The lake contained about 40,000,000 gal. of water and was treated with 1,200 lb. of copper sulphate in crystal form, an equivalent of 30 lb. per 1,000,000 gal. The copper sulphate was put into gunny sacks containing about 50 lb. to each sack and was administered by dragging the sacks under the surface of the lake, using rowboats for the purpose. The process was repeated over the deeper portions of the lake where springs were known to exist until all the copper sulphate was dissolved, special attention being given to the water in the vicinity of all inlets where sacks of copper sulphate were placed and left to dissolve under the action of the inflowing water.

The effects of the poison, which took about three hours to administer, were manifest on the first day, the quantity of dead fish coming to the surface of the water increasing during the next 48 hours. On the fourth day a few live fish, evidently seeking fresh water, were seen in places close to the shore and at the mouths of the large brooks. Accordingly the water close to the shore was again treated and more poison deposited in the inlets, about 150 lb. of copper sulphate being used for this purpose. Two days later when the lake was next visited no live fish were seen and repeated tests since that time with dynamite and bait fishing failed to disclose the presence of live fish.

The question which arises in connection with the use of copper sulphate is the liklihood of rendering the water unfit for boiler use. Copper sulphate solutions are known to be corrosive to iron but should not be a troublesome factor when used for killing fish since the small amount required (four to five parts of a million gallons) may be rendered harmless by adding a small dosage of lime or (where the water, as is usually the case, contains lime salts in solution) by leaving the purification of the water to natural processes. In this case the copper precipitates and the free acid present apparently combines with the lime salts to form sulphates. Samples taken from Lake Wapanacki five weeks after the copper sulphate solution was administered, showed that the poison had entirely disappeared.

To show that the copper sulphate will kill fish, however, is not necessarily a recommendation that it is the proper method to pursue. This is brought out in a statement from the acting commissioner of the United States Bureau of Fisheries. "Copper sulphate has been used successfully for the destruction of undesirable fish. We do not, however, recommend its use. The wholesale destruction of fish in any body of water should be undertaken only after most careful consideration of all phases of the problem. Instances are recorded where domestic animals have suffered from drinking the overflow from waters so treated, and in most states the use of poisonous substances in the killing of fish is justly illegal. It would seem that where fish become so abundant in the impounding reservoirs as to cause trouble any progressive state conservation commission, or fish and game commission, would be glad to remove them alive for stocking public waters, so many of which are seriously depleted of their indigenous fish life. This would seem to us to be the more public spirited course to follow. In any event we would urge the desirability of consulting the proper officials of the states involved before undertaking to destroy the fish."

There is another point, moreover, which should be mentioned in any discussion appertaining to the fish trouble in water. The question presupposes that the remedy is not in the remodeling of the screen covered intake itself. It is known that many intakes do not exclude fish and that the flow into some intakes would be obstructed were the mesh made so fine as to prevent their entry, but in this case the solution may very well be the construction of a larger intake which will provide a screened area large enough so that sufficient water may reach the intake to supply the pump regardless of the fineness of the mesh. D. A. STEEL.

Is It Safe to Use Concrete In Soil Containing Alkali?*

The following is a summary of the present knowledge regarding the behavior of concrete in alkaline soils, prepared by G. M. Williams, professor of civil engineering, University of Saskatchewan, Saskatoon, Sask., based on research and investigations which he has conducted for several years:

1. In many districts of the Western states and Canada there are areas where the salt content of the soil is high and concrete cannot be used with assurance of success.

2. Study of field conditions indicates that deterioration of concrete structures is almost entirely confined to regions where the sulphate type predominates. Good quality concrete is apparently being successfully used in chloride and carbonate soils.

3. Rapidity of disintegration varies directly as the sulphate concentration.

4. Where concentrations are permanently low, good quality concrete appears to have a life which fully justifies its use.

5. Concentration of salt in ground water may be extremely variable at points short distances apart. There also appears to be seasonal or yearly variation in some districts.

6. Concrete of high quality is most resistant to action. High quality for exposure to alkaline conditions is measured by impermeability or resistance to passage of water through the mass under pressure. The one big factor necessary to secure low permeability is high cement content, so that high compressive strength can generally be used as a criterion of low permeability. Consistency, within practical working limits, and gradation of aggregate are secondary factors in obtaining a concrete of low permeability.

7. Where alkali conditions are bad, the factor of safety against failure can be greatly increased by employing proper drainage precautions.

8. The employment of a membrane waterproofing may prevent action for a time at least, but such a method is not practicable under all conditions.

9. Portland cement, as now constituted, is inherently subject to attack by sulphates in the soil and ground water and the practical and final settlement of the alkali-concrete problem is dependent upon modification of, or the discovery of some material which may be added to portland cement to make it immune to such action.

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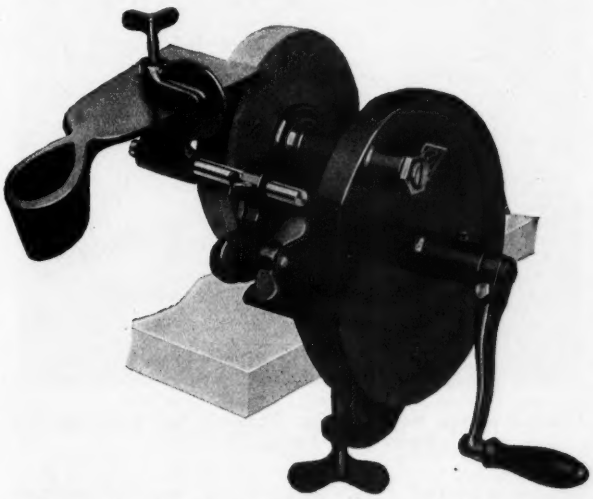
*Abstract from a paper presented before the American Society for Testing Materials, in June, 1923.

New and Improved Devices

Special Attachments Increase Usefulness of Tool Grinder

THE illustration shows a tool grinder equipped with a special attachment for sharpening adzes, which is one of a number of attachments which have been developed for use in connection with the grinder. The grinder itself is a bench tool consisting of a flat grinding wheel rotated by hand power by means of the typical hand crank through a gear set, all compactly arranged and supported on a cast iron base provided with a thumb screw for clamping to either a table or a bench. The gears are



Putting a Hollow Ground Edge on an Adze with the Luther Tool Grinding Attachment

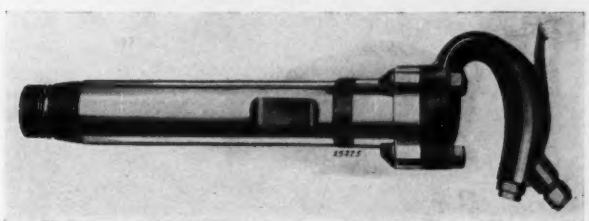
completely enclosed in a case to promote safety and to add to the smooth, easy running of the grinder. The attachments have been designed for use by wholly unskilled operators.

In addition to the adze sharpening attachment there are attachments for sharpening pipe dies, chisels, flat drills, twist drills, for redressing the grinding wheel, etc. In every case the effort has been made to provide an attachment which is easy to assemble. Three attachments are involved in the sharpening of an adze. One of these is a slotted member connected by a thumb screw to the extended base of the grinder, which is also slotted to provide for any desired adjustment. This member holds a horizontal rod which may be also shifted by means of a thumb screw. On the end of this rod immediately in front of the grinding wheel is a yoke, designed to fit the adze and to permit its being shifted back and forth on the horizontal rod in order to bring the grinding wheel in contact with the adze at all points. It is only the last mentioned of these members which is strictly the adze attachment, the other two attachments constituting the permanent though adjustable bracket arrangement. When it is desired to grind adzes, drills or pipe dies, or to redress the shape of the grinding wheel, etc., it is thus necessary only to add one attachment and to adjust the permanent bracket sufficiently to bring the grinding wheel in contact with the tool to be sharpened.

Owing to the simplicity and accuracy of the attachment adjustments this grinding tool has proved especially valuable in sharpening twist drills and bonding drills, there being nothing to get out of order about the attachments and the means being provided of securing a correct bevel in the hands of any unskilled laborer. In each case the drill to be sharpened is held rigidly over its entire length in such a way as to require no change in position during the entire period of sharpening. This grinder is known as the Luther tool grinder and is the product of the Luther Grinding Manufacturing Company, Milwaukee, Wis.

A New Type Riveting Hammer

THE Ingersoll-Rand Company, New York City, has developed and is now offering a new type of pneumatic riveting hammer embodying a number of improvements. This hammer has been thoroughly tested on all classes of work. The outstanding features of this riveter include bolted construction for holding the handle in



An Improved Riveting Hammer

the barrel; a heavy section valve; a combination poppet and piston type throttle valve; power in excess of ordinary requirements; low air consumption and easy operation.

The new hammers are manufactured in three styles and are available in a complete range of sizes from a five-inch to nine-inch stroke. Each size of this riveter can be purchased with any one of three types of barrels and with either outside or inside trigger handles. The standard "A" type has a barrel machined to accommodate a rivet set clip only and is furnished on all orders which do not specify either a bridge-type or retainer-type barrel.

Three alloy steel bolts, fitted with lock washers, hold the handle to the barrel. This enables them to be taken apart anywhere for inspection or cleaning with the aid

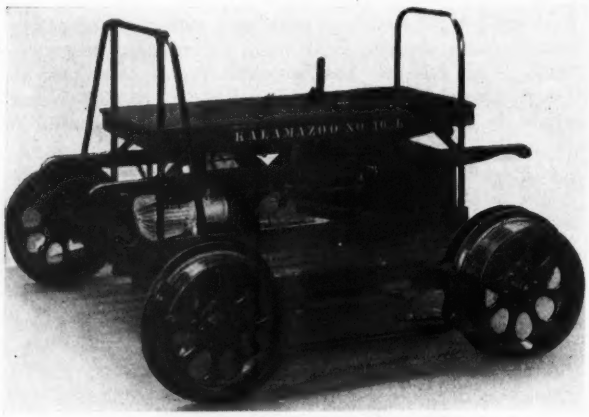
of only a wrench. The throttle lever or trigger is made in one piece from special heat treated spring steel and has a long bearing in the handle. The control is sensitive. ranging from a light tap to a heavy blow, at the will of the operator.

The valve is a sleeve made from special alloy steel. Its walls are free from holes or ports which so often are the starting points for checks or cracks. It operates in a valve box, located in the head of the barrel. This valve box is constructed with a solid end which enables it to be taken apart easily by the use of a piston for the removal of the valve, without recourse to the use of a screw driver or similar instrument with subsequent danger of injury. This construction also insures a compression chamber in the valve box which cushions the piston on the return stroke and prevents the piston from striking the handle.

An Improved Kalamazoo Motor Car

THE Kalamazoo Railway Supply Company, Kalamazoo, Mich., has recently introduced a new motor car known as the Kalamazoo No. 16 L inspection car, which is an improvement on its No. 16 car. The principal objective in developing the new car was to effect a substantial reduction in weight without in any way sacrificing the strength characteristic of the earlier car. A reduction of 50 lb. has been accomplished, the new car weighing only 350 lb., although it carries such additional equipment as safety railings at each end of the car and a special and useful arrangement below the body to prevent wheels from dropping between the rails when removing the car from the tracks.

The new car is designed with a view particularly to its use by one man, being strictly an inspection car, but

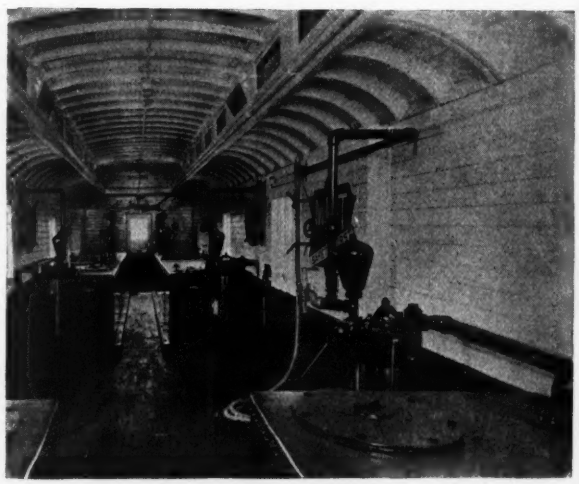


The New Kalamazoo Motor Car

has capacity for seating two men comfortably. It has the same power plant as the Kalamazoo No. 16 car, including magneto ignition, free engine clutch, step starter and a brake acting on the two drive wheels. As in the former car the engine is a modified two cycle type which will run on either gasoline or kerosene. It runs on wood center wheels with steel tires as before but the new wheels are 14 in. in diameter instead of 17 in., the principal reason for this being to secure greater assurance against derailment by reason of a lower center of gravity. Hyatt roller bearings are used on the driving axle and Bower roller bearings on the front. To secure lightness the tool tray is eliminated, reliance being placed upon a strip of wood extending across the ends of the car above the running board as a protection against endwise shifting of the few tools that need to be carried. Small tools are carried in a closed box beneath the seat of the car at one end. The wheel guards consist of metal plates between the running board and each wheel while the skid arrangement mentioned above consists of a length of pipe curved at the ends to prevent it from catching on obstructions and bolted to the frame below the car on each side. Several cars of this model which are now in service are reported to be rendering excellent service.

A Novel Railway Oil Supply Car

THE Missouri-Kansas-Texas is now operating in conjunction with its regular supply train, an oil car which marks a new departure in this class of equipment. The car is a converted baggage car which contains nine tanks of rectangular dimension as distinguished from the usual cylindrical type of tank. These tanks are each 36-in. high and 46-in. wide, and are built of 3/16-in. plates, with capacities varying from 120 gal. to 1,250 gal. each. The tanks of large capacity are fitted with baffle plates arranged to prevent undue surging of the contents when



Interior of the New Oil Car Showing the Self-Measuring Pumps and Large Oil Tanks

the car is started or stopped. Those carrying oils used in large quantity are located adjacent to the center doors and are connected to five gallon pumps of the self- measuring and recording type. These pumps, which are products of S. F. Bowser & Co., Inc., Fort Wayne, Ind., are provided with the usual type of discharge fittings for filling containers inside the car, also a branch line carried overhead to the sides of the door openings where they terminate in hose extensions for filling local storage tanks. Deliveries from the five smaller tanks, which carry oils used in small quantities, are made by one-gallon pumps mounted directly on the tank rather than from the usual spigot.

The car used is an old four wheel truck baggage car of 60,000 lb. capacity which was fitted up for oil service by reinforcing the under frame with two, eight-inch I beam center sills placed under the wood center sills of the old underframe. Between the bolster, cast steel cross ties have also been added. The tanks in the car are set in pockets in the floor formed by timbers which are bolted through the floor, the tanks thus being restrained from moving out of place without being subjected to excessive strain themselves. The car is lighted with electric light, supplied by a Delco lighting plant located in one of the

other supply train cars. Aside from the orderly arrangement and attractive appearance of the new arrangement, it is possible to fill the tanks from barrels, if necessary, although the car is ordinarily filled from storage by means of portable air pumps. The new car is credited with large reductions in the amount of oil requisitioned.

Titanium Pigment for Signs and Interiors

UNTIL recently titanium has been classified as one of the rare minerals and in the industrial field has been considered only in connection with ferro-titanium, which is employed largely as a cleanser of steel. The fact that the oxide of titanium is a white, opaque powder of unusual inertness, however, has made the mineral the object of close attention when it was learned that titanium, instead of being a rare mineral, is widely distributed throughout the earth in abundant quantities. The primary reason for this development arises from the need of a white pigment of superior quality. Old as the art of painting and paint making is, only four white opaque pigments had been developed until recently, namely, the two white leads, zinc oxide and a compound known as lithopone. While all of these pigments are extensively used they have their limitations as paint pigments. These pigments are divided into two classes, (1) the inert pigments such as white china clay, silica, barite and asbestine, which have little or no hiding power or opaqueness when mixed with oil and spread as paint, and (2) the opaque white pigments such as white lead and zinc oxide, which have hiding power and whiteness, when ground with such vehicles as linseed oil. The titanium pigments which have been developed belong to this class.

Two types of titanium pigment have been developed, (1) that consisting essentially of pure titanic oxide and (2) compositions wherein titanic oxide is mixed with a suitable base. Titanox is a representative of the latter class. This pigment contains approximately 25 per cent of pure titanic oxide and 75 per cent of barium sulphate, the effect of which is to make the titanium oxide commercially practicable for painting without diminishing its opacity. Although this mixture contains only 25 per cent of the pure oxide, it has an opacity equal to 85 to 90 per cent of the pure material, the opacity of which is said to be approximately three times that of white lead and double that of zinc oxide. This opacity or hiding power makes the pigment especially desired where a maximum degree of reflection to light is desired, as in coach interiors, ceilings, etc. Chemically the pigment is extremely stable, being practically inert and unaffected by ordinary acids or alkalis. This is a characteristic which gives any paint in which it is used a high degree of resistance against discoloration. It is non-poisonous and on exposure chalks somewhat more than white lead. The chalking feature, of course, is desirable when held under sufficient control by the presence of other materials to prevent checking.

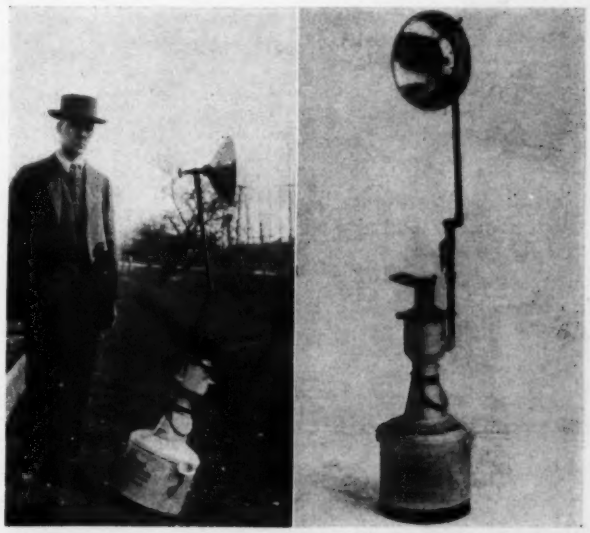
Titanox is now being used in the manufacture of all kinds of paint products, but it is not recommended for use alone, being strictly a paint pigment. For exterior paint it is the usual practice to grind the pigment to semi-paste form, together with a lesser amount of zinc oxide pigment, although zinc oxide pigment is susceptible to discoloration and is not recommended where sulphureous gasses are likely to affect the pigment. The pigment comes in a form which permits its reduction without breaking up heavy paste and owing to its non-poisonous character and spreading quality is particularly adapted for spraying. The characteristic opacity, of course, is to be considered where it is desired to apply paint as thinly as possible in the interests of economy. Being without drying action on the oil it must be handled somewhat differently from paint containing lead which is a natural dryer, more drier and turpentine usually being necessary in undercoats.

The titanium pigment industry has been developed independently by two concerns, the Titan Company of Norway, and in this country by the Titanium Pigment Company, Inc., Niagara Falls, N. Y. This organization is now operating to capacity a plant at Niagara Falls. It has its titanium deposits in Florida, and has recently purchased extensive barite deposits and smelting facilities at St. Louis.

High Power Flood Light

A 5,000 CANDLE POWER acetylene flood light has been put on the market recently, which is especially adapted to railroad use. It weighs only 30 lb. and stands 5½ ft. high when ready for use, but has a folding standpipe so that its length when folded is 39 in. The base of the tank is 12 in. in diameter, which, together with a low center of gravity, gives it unusual stability. It will stand at an angle of 30 deg. from the vertical without tipping.

However, no harm is done in case the lamp is upset, rolled around or left on its side for some time, because



The Portable Flood Light Is Unusually Stable Against Overturning

rough handling will not cause spilling of either the water or the carbide. Moreover, the light will work properly as soon as righted. This feature of the lamp is obtained through the particular design of the mixing arrangement, whereby one moving part, a plunger, automatically feeds or drops the carbide piece by piece into the water chamber, in response to the gas demand. The arrangement is such that the unused carbide cannot come in contact with the water or with the water vapor.

Another feature of the light is that it will run for 10 hours without recharging, either in a continuous run or one hour a night for 10 nights. It is also said that a 30-day period of disuse after charging will not affect its operation or result in any deterioration of the carbide in the charge. Use of the light after a period of idleness does not entail any manipulation of the apparatus other than to turn it on or off.

The generator is of pressed steel, tinned inside and

out and painted. The reflector is aluminum. The carbide hopper and water tank are securely fastened together, but come apart readily for the purpose of recharging. An idea of the cost of operating this light is to be had from the fact that the charge for 10 hours' operation is five pounds of commercial carbide, which sells for about $5.40 per 100 lbs. This lamp, which is known as the V. G. portable flood light, is manufactured by the Blake Manufacturing Company of Mansfield, Pa.

A New 22-Ton Crane

THERE has recently been installed on a number of railroads, including the Wabash, the Belt Railway of Chicago and the Pennsylvania, a 22-ton crane which has just been developed by the McMyler-Interstate Company, Cleveland, Ohio. This crane embodies a completely new design. It is mounted on standard gage trucks and is equipped with side jacks for use where a wide swing of operation is desired.

The new crane is unusually swift, having a normal single line hoisting speed for maximum loads of 300 ft. per min. This crane is also distinctive in the unusually large amount of room provided in the cab for the operator and fireman. The operator stands at the front right hand corner of the platform where he has all levers in front

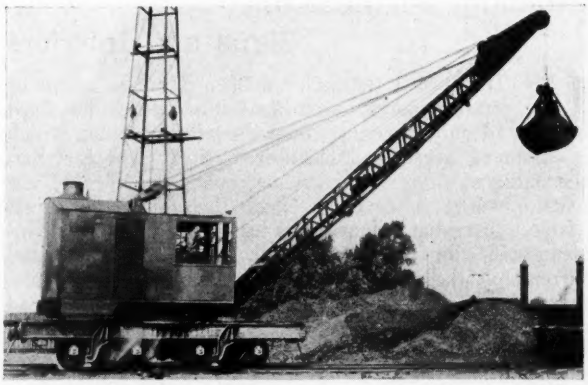
The New McMyler No. 4 Revolving Crane

and a clear view of all work undertaken. The standard equipment includes a fully enclosed cab with a steel sash.

A distinguishing feature of the mechanism is the small number of gears, there being eight less than in the earlier McMyler machines. Another special feature is the use throughout the machine of brake and friction lining made of material which can be secured generally throughout the country, instead of necessitating the making of requisitions on the manufacturers when repairs are desired. The mechanism is readily accessible, it being possible to remove any of the shafts of the hoisting mechanism without interfering with other shafts. The crane is equipped with two drums instead of the usual main and auxiliary drums, which feature contributes to the value of the crane for fall-block operations since either of the power drums may be used.

Among the additional features is the simplified control for all operations. A single lever controls each operation and is moved in the same relative direction at all times. When the hand lever is thrown in one direction the right hand clutch is engaged, while if moved in the opposite direction the left hand clutch is engaged. Since the engine operates in the same direction at all times, the possibility of confusion is eliminated because the operating levers are not reversed when the engine is reversed.

The new crane will handle a fall block, a two-line driving attachment, and has sufficient tractive effort to shift several loaded cars. It is adapted for operating bucket, a lifting magnet, a drag line bucket or a pile

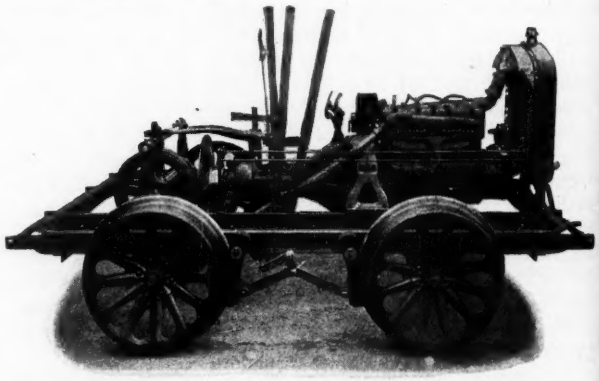


Looking at the Crane from the Other Side

40-ft., 50-ft. or 60-ft. booms at radii ranging from 12 to 60 ft. It has a line pull for rapid bucket work of 7,500 lb. at a 12 ft. radius, while at this radius with a 40-ft. boom the crane has sufficient stability to lift 45,000 lb. The trucks are of the 40-ton capacity arch bar M. C. B. radial type with 5-in. by 9-in journals, with brakes on all eight wheels, and through train line connections for transportation.

A Motor Car with a Ford Engine

TO meet the needs of a heavy-duty, all-purpose motor car, the Northwestern Motor Car Company, Eau Claire, Wis., has developed the Casey Jones 550, which it has equipped with a Ford engine. The installation includes the engine complete with radiator, ignition and transmission. Because the car is friction driven the

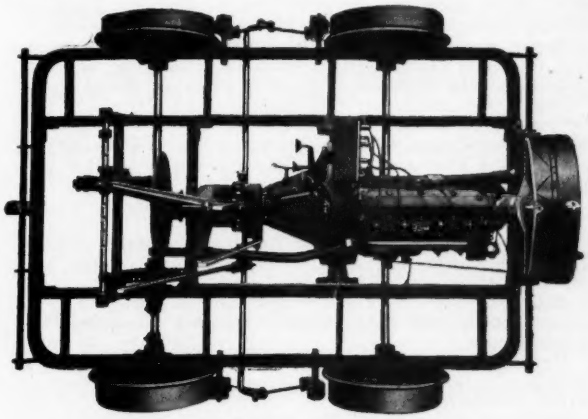


A Side Elevation with the Seat Removed

Ford transmission is not used, but as the engine is installed entire with the foot pedals, etc., it is complete and interchangeable for other uses.

The frame is made of three-inch steel channels with hot riveted connections. It is equipped with a Hyatt roller bearing on the drive shaft and five roller bearings on the axles, the fifth bearing being placed directly beside the drive sprocket on the drive axle. The standard

type of friction drive is used on the car with a few improvements in design and a strengthening of parts. A roller chain and hard steel pinions complete the drive from the counter shaft to the real axle. In design, the car is of the center load type with a seating capacity for 10 men, but its hauling capacity with the aid of trailers is said to be 50 men under average conditions. Safety features include full protection of the motor,



A Plan View with the Floor Removed

safety railings on both ends of the seat and guards over the wheels.

An additional feature on the car is a two-inch crown-faced pulley on the end of the drive shaft which affords means by which the engine may be used as a power unit to driven centrifugal pumps or other equipment. Regular Ford headlights and tail lights may be installed on the car and operated from the current generated by the standard Ford magneto. When desired the

View from the Front

standard Ford starter, battery and generator may also be added.

Two important advantages have been suggested for the use of the Ford motor on the car, both of which arise from the widespread use of this equipment in this country. One is the readiness with which repair parts or repair service can be obtained almost anywhere and the second arises from the fact that so many men all over this country are familiar with the operation of Ford motor cars, there is almost sure to be some man in the gang who is able to operate the car without any preliminary training.

With the Associations

American Railway Engineering Association

The work of the committees is rapidly approaching completion, 10 reports having been finished and turned over to the secretary in addition to portions of 9 others.

The nominating committee has presented the following nominations which will go upon ballots to be distributed in the near future:

For president, G. J. Ray, chief engineer, D. L. & W.

For vice-president (one to be elected), C. F. W. Felt, chief engineer, A. T. & S. F., and E. B. Temple, assistant chief engineer, Penna.

For secretary, E. H. Fritch.

For treasurer, G. H. Bremner, engineering department, C. B. & Q.

For directors (three to be elected), A. F. Blaess, engineer maintenance of way, I. C.; F. L. C. Bond, chief engineer, Central region, C. N.; A. M. Burt, assistant to vice-president, operation, N. P.; W. D. Faucette, chief engineer, S. A. L.; C. E. Johnston, general manager, K. C. S.; W. H. Kirkbride, engineer maintenance of way and structures, S. P.; J. V. Neubert, engineer maintenance of way, N. Y. C.; H. L. Ripley, corporate and valuation engineer, N. Y., N. H. & H., and W. P. Wiltsee, chief engineer, N. & W.

For nominating committee (five to be elected), M. C. Blanchard, chief engineer, Western lines, A. T. & S. F.; W. J. Burton, assistant valuation engineer, M. P.; C. C. Cook, maintenance engineer, B. & O.; R. H. Ford, assistant chief engineer, C. R. I. & P.; C. R. Harding, consulting engineer, S. P.; Frank Lee, engineer maintenance of way, C. P.; A. Montzheimer, chief engineer, E. J. & E.; A. R. Raymer, chief engineer, P. & L. E.; A. H. Rudd, chief signal engineer, Penna., and J. E. Willoughby, chief engineer, A. C. L.

American Railway Bridge and Building Association

The following committees have been selected to investigate and report at the 1924 convention.

Smoke Jacks for Roundhouses and Other Railroad Buildings: Maro Johnson, assistant engineer, Illinois Central, Chicago, chairman; T. D. Kemp, assistant engineer maintenance of way, Southern, Charlotte, N. C.; J. K. Bonner, supervisor bridges and buildings, New York Central, Watertown, N. Y.; V. E. Engman, chief carpenter, Chicago, Milwaukee & St. Paul, Terre Haute, Ind.; E. R. Wenner, supervisor bridges and buildings, Lehigh Valley, Ashley, Pa., and A. B. McVay, supervisor bridges and buildings, Louisville & Nashville, Evansville, Ind.

Maintenance of Water Stations: O. C. Anderson, foreman water service, Southern Pacific. San Francisco, Cal., chairman; F. M. Case, foreman water service, Chicago & North Western, Belle Plaine, Iowa; J. M. Fitzgerald, office engineer, Central of Georgia, Savannah, Ga.; C. R. Knowles, superintendent water service, Illinois Central, Chicago; Emil Oetzman, superintendent water service, Atchison, Topeka & Santa Fe, Fresno, Cal., and L. A. Cowsert, supervisor water service, Baltimore & Ohio, Dayton, Ohio.

Relative Merits of Different Kinds of Roofing Materials for Various Types of Buildings: R. E. Caudle, assistant engineer structures, International-Great Northern, Palestine, Tex., chairman; A. C. Copeland, office engineer, Chesapeake & Ohio, Richmond, Va.; G. A. Rodman, general supervisor bridges and buildings, New York, New Haven & Hartford, New Haven, Conn.; H. A. Horning, superintendent buildings,

New York Central, Jackson, Mich.; W. T. Krausch, engineer buildings, Chicago, Burlington & Quincy, Chicago; R. J. Bruce, general building inspector, Missouri Pacific, St. Louis, Mo., and K. Peabody, supervisor piers and buildings, New York Central, New York City.

Economical Methods of Handling Minor Maintenance Work: T. G. Sughrue, supervisor bridges and buildings, Boston & Maine, Nashua, N. H., chairman; T. H. Durfee, supervisor bridges and buildings, Chicago & North Western, Antigo, Wis.; T. A. Spreyer, general foreman, New York, engineer maintenance of way, Union Pacific, Omaha, Neb., New Haven & Hartford, Bridgeport, Conn.; R. B. Robinson, and E. W. Singer, supervisor bridges and buildings, New York, Chicago & St. Louis, Ft. Wayne, Ind.

The Fire Hazard of Treated Timber, paper by C. S. Heritage, bridge engineer, Kansas City Southern, Kansas City, Mo.

Reduction of Accidents to Employees: T. W. Pinard, assistant engineer maintenance of way, Pennsylvania, Chicago, chairman; D. Rounseville, assistant chief engineer, Chicago & North Western, Chicago; D. T. Rintoul, assistant general bridge inspector, Southern Pacific, San Francisco, Cal.; E. G. Storck, master carpenter, Philadelphia & Reading, Philadelphia, Pa., and J. J. Wishart, supervisor bridges and buildings, New York, New Haven & Hartford, Boston, Mass.

Inspection of Painting: Martin Kane, building superintendent, Delaware & Hudson, Albany, N. Y., chairman; W. S. Lacher, managing editor, *Railway Engineering and Maintenance*, Chicago; G. M. Hoffman, foreman painter, Philadelphia & Reading, Shamokin, Pa.; J. S. Airmet, foreman painter, Oregon Short Line, Nampa, Idaho; Charles Ettinger, supervisor bridges and buildings, Illinois Central, Chicago; J. R. Shean, Los Angeles, Cal., and R. E. Wait, supervisor bridges and buildings, Wabash, Decatur, Ill.

Placing Concrete in Winter: F. P. Gutelius, Jr., division engineer, Delaware & Hudson, Plattsburg, N. Y., chairman; T. H. Strate, engineer track elevation, Chicago, Milwaukee & St. Paul, Chicago; D. A. Tomlinson, manager railways bureau, Portland Cement Association, Chicago; E. L. Goldsmith, superintendent construction, Long Island, Jamaica, N. Y., and O. H. Dickerson, principal assistant engineer, Duluth & Iron Range, Duluth, Minn.

American Wood-Preservers' Association

The following is the program for the twentieth annual convention which will be held at the Hotel Muehlebach, Kansas City, Mo., on January 15-17.

Tuesday, January 15

Convention called to order.
Opening exercises.
Report of secretary-treasurer.
Appointment of special committees.
President's address.

Report of Committee on Publications, S. D. Cooper, chairman, assistant manager, treating plants, Atchison, Topeka & Santa Fe, Topeka, Kan.

Report of Committee on Retailing Treated Forest Products, George E. Rex, chairman, vice-president, National Lumber & Creosoting Company, Kansas City, Mo.

Paper on Visual Determination of Penetration of Sodium Fluoride in Treated Wood, by George T. Parker and H. A. Geauque, of Lombard College, Galesburg, Ill.

Tuesday Afternoon

Report of Committee on Preservatives, Ernest Bateman, chairman, chemist in forest products, Forest Products Laboratory, Madison, Wis.

Paper on Saving Timber by Saving Coal, by Dr. R. P. Soule, chemical engineer, Combustion Utilities Corporation, New York City.

Paper on A Theory on the Mechanism of the Protection of Wood by Preservatives: Part V, Further Work with Hydro-carbons, by Ernest Bateman and E. Henningson.

Paper on Comparative Resistance of Seventeen Species of Wood-Destroying Fungi to Sodium Fluorine, by Audrey C. Richards.

Report of Committee on Pressure Treatment of Posts, W. J. Smith, chairman, tie and timber agent, Missouri-Kansas-Texas, Denison, Tex.

Report of Committee on Utilization and Service of Treated Posts, W. J. Smith, chairman.

Report of Committee on Treatment of Ties, J. R. Helson, chairman, superintendent, Watkins Creosoting Company, Metropolis, Ill.

Report of Committee on Treatment of Douglas Fir Ties, H. E. Horrocks, chairman, manager, Pacific Creosoting Company, Seattle, Wash.

Report of Committee on Treatment of Timber, H. R. Condon, chairman, assistant forester, Pennsylvania, Philadelphia, Pa.

Report of Committee on Treatment of Piling, W. J. Kelleher, chairman, general manager, Southern Creosoting Company, Slidell, La.

Wednesday, January 16

Report of Committee on Pressure Treatment of Poles, C. C. Fritz, chairman, manager, pole department, Long-Bell Lumber Company, Kansas City, Mo.

Report of Committee on Use of Petroleum with Creosote Oil or Other Toxics, R. S. Belcher, chairman, manager, treating plants, Atchison, Topeka & Santa Fe, Topeka, Kan.

Paper on Solutions of Zinc Chloride and Petroleum Oils, by Ernest Bateman.

Report of Committee on History and Use of Zinc Chloride as a Wood Preservative, Dr. Herman von Schrenk, chairman, consulting timber engineer, St. Louis, Mo.

Wednesday Afternoon

Report of Committee on Non-Pressure Treatment of Poles, L. L. Hill, chairman, secretary, Page & Hill Company, Minneapolis, Minn.

Report of Service Bureau Board, Carl G. Crawford, chairman, vice-president, American Creosoting Company, Inc., Louisville, Ky.

Report of Committee on Track Service Records, Z. M. Briggs, chairman, assistant engineer, maintenance, Pennsylvania, Pittsburgh, Pa.

Paper on Relation of Temperature and Pressure to the Absorption and Penetration of Zinc Chloride Solution Into Wood, by J. D. MacLean, engineer in forest products, Forest Laboratory, Madison, Wis.

Thursday, January 17

Report of Committee on Inspection, F. N. Graham, chairman, chief timber inspector, Chicago Great Western, Chicago.

Report of Committee on Steam Treatments, George M. Hunt, chairman, in charge section of wood preservation, Forest Products Laboratory, Madison, Wis.

Election of officers.
Closing business.

Tie Producers' Association

The National Association of Railroad Tie Producers will hold its sixth annual convention at the Hotel Muehlebach, Kansas City, Mo., on January 17-18, following immediately after the convention of the American Wood-Preservers' Association. The convention will be called to order at two o'clock on the afternoon of January 17. The program follows:

Thursday Afternoon

Opening exercises.
Reports of officers and standing committees.
Reports of district vice-presidents on conditions in the tie industry in their areas.

Thursday Evening

Annual dinner with the American Wood-Preservers' Association.

Friday, January 18

Paper on Southern Pine Ties, by C. D. Christian.

Paper on Why There Is a Need for a Tie Association, by J. H. Johnson, B. Johnson & Son, Richmond, Ind.

Paper on Developments in the Tie Industry During the Last 20 Years, by Dr. Herman von Schrenk, consulting timber engineer, St. Louis, Mo.

Paper on Cross Tie Conditions on the Pacific Coast, by Mason E .Kline, superintendent, St. Helens Creosoting Company, St. Helens, Ore.

Luncheon

Address on The Railroad Problem and the Tie Industry, by L. W. Baldwin ,president, Missouri Pacific, St. Louis, Mo.

Friday Afternoon

Paper on How Motor Trucks Handle Cross Ties, by Saunders Jones, vice-president, White Motor Company, St. Louis, Mo.

Paper on How Can the Railroads and Tie Producers Cooperate to Secure a More Practical Separation of the Ties in Field? by D. E. Erhart, lumber agent, Pennsylvania, Cen-

tral region, and Walter Poleman, president, Western Tie & Timber Company, St. Louis, Mo.

Closing business, election of officers and selection of meeting place for next convention.

Maintenance of Way Club of Chicago

The Maintenance of Way Club of Chicago, held a meeting at the Auditorium Hotel, Chicago, on the evening of December 12, with an attendance of 55. The maintenance of tracks owned by industries was presented from the standpoints of traffic, operating and maintenance of way officers by O. F. Scudder, industrial agent, Chicago, Burlington & Quincy; Col. C. L. Whiting, terminal superintendent, Chicago, Milwaukee & St. Paul and E. D. Swift, engineer maintenance of way, Belt Railway of Chicago.

International Track Supervisors' Club

The International Club held a meeting at the Queen's hotel, Toronto, Ont., on December 1, with an attendance of 44. The meeting was addressed by Arthur Crumpton, valuation engineer of the Canadian National and W. E. Gillen, general manager of the Toronto Terminal railroad. Mr. Crumpton talked on the importance of the roadmasters position and outlined what he considered the most important qualifications for success as a roadmaster. Mr. Gillen presented an address on the improvement of locomotives, giving some interesting data on various classes of locomotives from the largest in use today and the modern electric locomotive to the small power units used in early days. Following these talks moving pictures showing the manufacture of shovels were exhibited by N. E. Brooks of the Wyoming Shovel Works. Before the close of the meeting 20 new members were enrolled. The meeting then adjourned to make an inspection of the new Toronto Union Station, at the invitation of Mr. Gillen.

Directory of Associations

American Railway Bridge and Building Association.—C. A. Lichty, secretary, C. & N. W. Ry., 319 North Waller Ave., Chicago. Next convention Kansas City, Mo. October 14-16, 1924. Exhibit by Bridge and Building Supply Men's Association.

American Railway Engineering Association (Works in co-operation with the American Railway Association, Division IV).—E. H. Fritch, secretary, 431 South Dearborn St., Chicago. Annual convention, Congress Hotel, Chicago, March 11-13, 1924. Exhibit by National Railway Appliances Association.

American Wood Preservers' Association—P. R. Hicks, secretary, Room 1146 Otis Bldg., Chicago. Next convention, January 15-17, 1924, Muehlebach Hotel, Kansas City, Mo.

Bridge and Building Supply Men's Association.—John Nelson, secretary, Joseph E. Nelson & Sons, 3240 South Michigan Ave., Chicago. Exhibit in connection with annual convention of American Railway Bridge and Building Association.

National Association of Railroad Tie Producers.—J. S. Penney, secretary, T. J. Moss Tie Company, St. Louis, Mo. Next convention, January 17-18, 1924, Muehlebach Hotel, Kansas City, Mo.

National Railway Appliances Association.—C. W. Kelly, secretary, People's Gas Bldg., Chicago. Annual exhibit at Coliseum, Chicago, in connection with convention of American Railway Engineering Association.

Roadmasters' and Maintenance of Way Association.—P. J. McAndrews, secretary, C. & N. W. Ry., Sterling, Ill. Next convention, Commodore Hotel, New York, September 16-18, 1924. Exhibit by Track Supply Association.

Track Supply Association.—W. C. Kidd, secretary, Ramapo-Ajax Corporation, Hillburn, N. Y. Exhibit in connection with convention of Roadmasters' and Maintenance of Way Association.

The Material Market

PRICES of iron and steel materials during 1923 were influenced by the fact that it was a year which called for a record production. The output of pig iron, 40,260,000 tons, was greater than in any previous year. The production of steel, 44,800,000 tons, was less than one per cent smaller than the record of 1917. In view of indications pointing to a continued demand in the volume commensurate with that prevailing during a good part of 1923, there is reason to believe that prices will continue on a thoroughly stable basis. Some minor adjustments have taken place as, for instance, in the case of track spikes and track bolts, which are quoted somewhat lower than a month ago. However, there is no indication of any change in prices with respect to wire products or structural steel, the market for the latter being affected by increased activity in bridge and building work and in car manufacture.

PRICES IN CENTS PER POUND

	November 20		December 20	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	.... to $3.15	.... $3.25	$3.00 to $3.15	.... $3.10
Track bolts	$4.00 to 4.25	.... 4.25	4.00 to 4.25	.... 4.10
Angle bars	.... to 2.75	.... 2.75	.... to 2.75	.... 2.75
Tie plates, steel	2.55 to 2.60	.... 2.60	2.55 to 2.60	.... 2.60
Tie plates, iron	.... to	.... 2.75	.... to	....
Plain wire	.... to 2.75	.... 3.19	.... to 2.75	.... 3.19
Wire nails	.... to 3.00	.... 3.34	.... to 3.00	.... 3.34
Barbed wire, galv.	.... to 3.80	.... 4.14	.... to 3.80	.... 4.14
C. I. pipe, 6 in. to 12 in., per ton	.... to	.... 56.20	.... to	.... 55.20
Plates	.... to 2.50	.... 2.60	.... to 2.50	.... 2.60
Shapes	.... to 2.50	.... 2.60	.... to 2.50	.... 2.60
Bars, soft steel	.... to 2.40	.... 2.50	.... to 2.40	.... 2.50

During the course of the last four weeks a healthy tone was manifested in the condition of the scrap market. As shown in the table below, there has been an appreciable increase in prices:

PRICES PER GROSS TON AT CHICAGO

	November	December
Relaying rails	$32.00 to $35.00	$32.00 to $35.00
Rails for rerolling	15.50 to 16.00	18.00 to 18.50
Rails less than 3 ft. long	16.50 to 17.00	19.50 to 20.00
Frogs and switches cut apart	14.00 to 14.50	17.25 to 17.50
Steel angle bars	16.00 to 16.50	19.00 to 19.50

The lumber market manifests a rather mixed state of affairs. Southern pine prices are slightly lower than a month ago, while those for Douglas fir show some advances and some reductions. In the Southern pine field a falling off in orders on hand during October and the first part of November was followed by an increase in business extending through the month of December. However, orders on hand at the end of 1923 total approximately 30 per cent less than at the end of 1922. In Douglas fir territory orders through the month of December are fully 10 to 12 per cent higher than during the month of December, 1922.

SOUTHERN PINE MILL PRICES

	November	December
Flooring, 1x4, B and B flat	$45.35	$43.30
Boards, 1x8, No. 1	36.05	37.40
Dimension, 2x4, 16, No. 1, common	26.00	25.85
Timbers, 4x4 to 8x8, No. 1	30.25	27.60
Timbers, 3x12 to 12x12, rough	40.10	38.60

DOUGLAS FIR MILL PRICES

Flooring, 1x4, No. 2, clear flat	32.00	30.00
Boards, 1x6, 6x20, No. 1, common	16.20	18.50
Dimension, 2x4, 16, No. 1, common	19.50	18.50
Dimension, 2x10, 16, No. 1, common	19.50	18.50
Timbers, 6x6 to 8x8, No. 1, common	24.00	26.00
Timbers, 10x10 to 12x12, rough	26.00	25.00

No changes are recorded in the prices of Portland cement as indicated in the table below, which gives quotations per barrel for carload lots; not including package.

Chicago	$2.10	Albany	$2.32
Cincinnati	2.44	Buffalo	2.48
Davenport	2.33	New York	2.25
Minneapolis	2.42	Philadelphia	2.41
Pittsburgh	2.19	Richmond, Va.	2.47
Boston	2.63		

News of the Month

The railroad employees brotherhoods have made a preliminary application for a charter for a co-operative national bank at Portland, Ore., with a capitalization of $200,000, and a surplus of $50,000 and to be administered in a manner similar to railroad labor banks located elsewhere in the country.

Commissioner Henry C. Hall of the Interstate Commerce Commission has been elected chairman of the commission to serve during 1924, pursuant to the policy adopted on January 13, 1922, that the term of office of chairman of the commission shall be rotated from year to year in the order of seniority of service.

Great Northern Stock to the amount of 5,100 shares was bought by 700 employees during the first three weeks in which the partial payment stock purchase plan inaugurated recently was in effect. Under this plan employees can purchase stock with an initial pavment of $5 a share, followed by monthly installments as small as $3 a share until payment is completed.

Automatic train control work has progressed to a point, according to a report of the Interstate Commerce Commission, where 3 railroads now have automatic train control devices in service, 5 other roads have installations under construction, 18 are conducting tests on short sections of track and 23 are investigating devices available for installation.

Reports of the Car Service division of the American Railway Association show that freight car loadings declined during December, the loadings for the week ended December 22 falling to 877,257 cars. This figure, however, was the highest ever attained at this season, being an increase of 50,945 cars as compared with the corresponding week of last year and of 210,652 cars as compared with the corresponding week of 1921.

The Southern Pacific directed the operation of trains on its Coos Bay branch by radio on December 7, sending orders from the government radio station at Marshfield, Ore., to the government radio station on Puget Sound and from there to the other end of the line at Eugene by Western Union telegraph wires, this expedient having been adopted by reason of a storm which temporarily rendered the company's wires useless.

The governor of Idaho has approved a plan to celebrate the fiftieth anniversary of the coming of the first railroad to that state. It is proposed to hold a celebration in Franklin, Idaho, on June 14-15, 1924, in connection with the celebration of Idaho Pioneers' Day. The first railroad in Idaho was the Utah Northern, which was put in operation on May 3, 1874, and later became a part of the Oregon Short Line. Franklin is 93 miles north of Ogden and is the first town in Idaho on the line between Ogden and Preston.

An amendment to the Railroad Valuation Act to provide a more practical manner of revising valuations, when once established, for the purpose of bringing them down to date, was suggested by the Interstate Commerce Commission in its annual report to Congress for the year ending October 31, 1923. The amendments proposed are two in number. The first would provide for adding to or subtracting from a basic valuation, once established, the net property changes made after the valuation date. The second is intended to meet the objection to adding a cost figure to a valuation figure and would provide for the ascertainment from time to time of changes in condition or value subsequent to the valuation date. The present terms of the law require that the valuation be brought up to date by the methods used in making the original valuation and the commission doubts the practicability of this cumbersome method.

A unique contest was held at the Colonie shops of the Delaware & Hudson on October 31, 1923, when five teams of six car repairers each, representing different points on the system, competed in stripping and rebuilding cars. The entire woodwork of five Delaware & Hudson composite twin hopper cars of 85,000 lb. capacity was removed and rebuilt in record time, the winning team rebuilding its car in 7 hr. and 49 min. The project was promoted to demonstrate the effect of personal interest of the employees in their work.

The Chicago, Rock Island & Pacific, in compliance with the Interstate Commerce Commission's order, has installed automatic train control on 165 miles of double track main line between Blue Island (Chicago) and Rock Island, Ill., and this installation has been inspected and approved by the Interstate Commerce Commission. This is the first road to receive the official approval of an automatic train control installation on a full engine district, as specified in the commission's order. The train control is of the intermittent ramp contact type with speed control.

The second section of the Twentieth Century Limited on the New York Central was wrecked at Forsyth, N. Y., 62 miles west of Buffalo, early on Sunday morning, December 9, when the third section ran into its rear end while it was standing at a grade crossing where an automobile had been hit by the first section a few minutes before. Eight passengers and a porter were killed and five passengers injured as a result of the collision, which totally demolished the rear car and seriously damaged the two cars ahead. Dense fog, the close spacing of the trains and the failure of the engineer on the last section to respond properly to signals contributed to the accident.

The management and employees of the Pennsylvania railroad have recently organized what is known as the Employees Provident & Loan Association for the purpose of assisting employees in buying homes, purchasing securities of the Pennsylvania and its subsidiaries, providing pensions in addition to those provided by the company and making emergency loans. Employees of the road may place their savings in this association by direct payment through an agent of the association or by deduction from the payroll. While this is not the first association of this character among the Pennsylvania employees, it is the first in which active assistance has been given by the management. The first association of the kind on the Pennsylvania was established in Philadelphia in March, 1922, as the Broad Building & Loan Association, all of the officers and directors of which, with the exception of the solicitor, are veteran employees of the road. It is estimated that by the end of March, 1924, it will have assets of $100,000. Other associations on the Pennsylvania are the Pennarr Endowment Building & Loan Association, which has been in existence since February, 1920, and which has 170 residence mortgage loans to employees of the Philadelphia Terminal division; the Penn System Building & Loan Association, which was organized on June 27, 1923, by employees in the general offices of the

Pennsylvania railway of Pittsburgh, and the Pennsylvania Railroad Y. M. C. A. Building & Loan Association of Jersey City, which has assets of $300,000, although it has been in existence only slightly more than four years.

Railroads Confer Track Awards

As in past years certain railroads have conducted track inspections, which form the basis for the award of prizes to supervisors and section foremen whose subdivisions or sections have excelled in appearance, condition of maintenance, riding quality of track, etc. Following are reports of the award of premiums received from the Eastern lines of the New York Central, the Central region of the Pennsylvania, the Chicago region of the Erie, the Long Island and the Richmond, Fredericksburg & Potomac. Similar reports concerning the Delaware, Lackawanna & Western and the three other regions of the Pennsylvania were published in last month's issue.

Richmond, Fredericksburg & Potomac

The annual awards to track foremen on the Richmond, Fredericksburg & Potomac were of two kinds, based on the condition of the track and on the cost of upkeep. The first prize of $100 for the best track was awarded to W. A. Sisson, the second prize of $80 to J. S. Carpenter, the third prize of $60 to Thomas Ogden and the fourth prize of $40 to Ernest Rodgers, while the first prize of $100 awarded on the basis of cost was given to Ernest Rodgers; the second prize of $80 to W. F. Donahoe; the third prize of $60 to R. C. Blank, and the fourth prize of $40 to J. W. Blanton.

Motor Cars Awarded on Southern

Following the practice adopted in 1920, the Southern railway again awarded motor cars to the foremen having the best sections on each supervisor's territory. Where sections were already so equipped, purses of $20 were given to the prize winners and the new motor cars were then awarded to the second best sections. If these sections also had motor cars, the foremen were awarded prizes of $10 and the motor cars were given to the third best sections. As a result of the annual inspection a total of 50 section cars and 12 bridge cars were awarded, together with 64 prizes of $20 each and 45 prizes of $10 each.

Chicago Region of the Erie

The first prize awarded on the Chicago region of the Erie was given to N. E. Scribner, supervisor of Subdivision No. 1 on the Kent division, at Kent, Ohio. The second prize of $100 was awarded to C. H. Staples, supervisor of Subdivision No. 4 on the Marion division at North Judson, Ind. The banner prize for the best section on the Kent division, amounting to $150, was given to S. Demore, section foreman at Akron, Ohio, while the banner prize on the Marion division was given to S. Kolanowsky, section foreman at Highland, Ind. In addition to the above, first prize of $100 and second prizes of $75 were given to section foremen having the first best and second best sections on eight supervisors' subdivisions on the Chicago region.

Awards on the Long Island

On the basis of markings made by the annual inspection party, consisting of executive, operating and engineering officers, the Long Island has, each year up to 1922, awarded prizes aggregating at least $1,150, to supervisors and section foremen, for what were considered to be the best maintained divisions and sections at the time of the annual inspection. In the latter part of 1922, the management appointed a "Marking Committee," which inspected the property bi-monthly, and the 1923 winners were selected on the basis of these periodical inspections and markings.

For the second successive year, F. J. Nehrhoff, supervisor of sub-division No. 4, won the first prize of $200, and W. M. Steers, supervisor of sub-division No. 5, received $100, the second prize, for the best line and surface. C. F. Dunbar, supervisor of sub-division No. 1, was awarded the special prize of $100 for the greatest improvement on any one division during the year.

The successful section foremen, their location on Long Island and the amount each received were as follows: C. Yannucci, Section 7, Division 1, Westbridge, $100; J. Abbatiello, Section 6, Division 1, Forest Hills, $50; J. Rozzano, Section 37, Division 2, Glen Head, $100; P. Retaino, Section 36, Division 2, Roslyn, $50; F. Maricio, Section 99, Division 3, Long Beach, $100; J. Stasi, Section 55, Division 3, Valley Stream, $50; M. Conway, Section 66, Division 4, Sayville, $100; P. Gillen, Section 69, Division 4, Centre Moriches, $50; C. Monteforte, Section 19, Division 5, Deer Park, $100, and J. Reichert, Section 25, Division 5, Riverhead, $50.

It has been the practice for 16 years to award the prizes for track maintenance a few weeks after the annual inspection of the property. This year the money was distributed during the progress of the annual track inspection, which was held on October 4 and 5. The supervisors received their respective awards on October 4, Vice-President George Le Boutillier making the presentation while entertaining the supervisors and assistant supervisors at luncheon. As the inspection train stopped at stations located on prize winning sections, the successful foremen, who were notified in advance to be on hand to meet the train, were presented with their checks by Mr. Le Boutillier.

The Central Region of the Pennsylvania

The annual award of prizes to supervisors and assistant supervisors on the Central region of the Pennsylvania System has been made as follows:

For the best line and surface maintained throughout the year on the Central region, W. S. Johns, Jr., supervisor at Trafford, Pa., $800, and P. X. Geary, formerly assistant supervisor at Trafford, $400.

For the best line and surface maintained throughout the year on the Eastern division, John Wright, supervisor at Wooster, Ohio, $600. and on the Panhandle division, J. C. Dayton, supervisor at Newcomerstown, Ohio, $600.

Prizes of $100 each were awarded to the following supervisors:

J. L. Conover, Buffalo division, Olean, N. Y.
J. T. Ridgely, Allegheny division, Oil City, Pa.
E. D. Flad, Renovo division, Emporium, Pa.
F. H. Rothe, Pittsburgh division, Pittsburgh, Pa.
B. M. Frymire, Conemaugh division, Freeport, Pa.
E. W. McGarvey, Monongahela division, Uniontown, Pa.
M. E. Davin, Wheeling division, Steubenville, Ohio.
E. W. Durban, Marietta division, Cambridge, Ohio.
W. H. Saltsman, C. & P. division, Ravenna, Ohio.
T. L. Hofmeister, E. & A. division, Ashtabula, Ohio.
M. J. Bray, Akron division, Orrville, Ohio.

New York Central

The annual track inspection on the New York Central resulting in Subdivision 13B of the Buffalo division, of which J. P. Sexton, Lackawanna, N. Y., is supervisor, receiving the highest rating among the main line subdivisions, 84.3. The second highest subdivision was No. 5 of the Mohawk division, of which H. I. Hoag, West Albany, N. Y., is supervisor, this division receiving a grade of 84.0. The Buffalo division received the highest division rating with a grade of 83.4.

Beginning this year, for purposes of inspection, the sections were arranged in classifications and groups, each group within each classification containing only sections of similar character, so that each foreman had an equal opportunity in working for a premium. There were five general classifications of track, in addition to the electric division, which was considered separately, while the number of groups in each classification ranged from five in Classification 4 to 11 in Classification 2 and 5, the latter covering yards and industrial tracks. The foremen having the highest mark in their respective groups in each classification received premiums of $5 a month, while the foreman having the highest mark in each of the general Classifications 1, 2, 3 and 5 received an additional premium of $3, making a total of $8 per month. In Classification 4 an additional premium of $2 was given, making a total of $7 per month.

The foremen who received the classification premiums are: Classification 1, John Andros, Subdivision 3, Eastern division; Classification 2, Emmanual Teats, Subdivision 27, Pennsylvania division; Classification 3, Charles Marcott, Subdivision 19, St. Lawrence division; Classification 4, George Dupont, Subdivision 8, Adirondack division, and Classfication 5, Frank Nowak, Subdivision 13, Buffalo division.

Labor News

E. F. Grable and Horace Baker were renominated by President Coolidge to serve as members of the labor and public groups, respectively, of the labor board on December 10. Their terms are for five years. The President has also nominated Goodwin C. Morrow, governor of Kentucky, as a new member of the labor board to succeed R. M. Barton.

What the Labor Board Has Done

The United States Railroad Labor Board had 12,270 disputed questions referred to it for decision from April 1, 1920, to November 1, 1923, according to a recent statement by the chairman. Of these questions, 10,671 have been disposed of. The board, he said, is now closing cases more rapidly than new ones are being filed and will soon catch up with its work. The only case in which the employees have violated the Transportation Act in a direct and absolute manner was in the recent strike of the engineers and firemen on the Virginian, in which case they ignored the imperative provisions of the act by failing to submit their grievances to the labor board before striking. He stated, also, that no railroad strike has succeeded since the creation of the Railroad Labor Board. The shop strike, the only strike of any magnitude which has occurred against the decision of the board, he said, served a useful public purpose, notwithstanding its disastrous effect, by demonstrating that a railroad strike cannot succeed against public sentiment.

Canadian Maintenance Men Take Strike Vote

According to press reports, returns on a strike vote now being taken among the members of the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers employed on the Canadian roads indicate that a large majority of the men are in favor of a strike. This strike vote is being taken as a result of the refusal of the railway managements to grant a wage increase recommended by the Board of Conciliation and Investigation. This board, which consisted of a chairman appointed by the minister of labor and one representative each of the railroads and the employees, unanimously recommended that a wage increase of two cents an hour be granted to maintenance of way employees now receiving less than 40 cents an hour, and also recommended certain changes in the wage agreement now in effect, including shortening the probationary period from six months to one month.

The determination to distribute strike ballots was arrived at in a recent meeting of the joint protective board of the brotherhood and a resolution to that effect was passed which was sent to Hon. James Murdock, minister of labor; Sir Henry Thornton, president of the Canadian National, and T. Moore, president of the Dominion Trades and Labor Congress.

When the brotherhood first sought wage increases last April it asked for an advance of five cents an hour, but it has expressed its willingness to accept the recommendation of a two-cent increase by the Board of Conciliation. In refusing to grant the increase recommended, the railway managements issued a statement to the effect that the recommendaion to increase the rates of pay cannot be accepted until some means have been found to secure the increased revenue required to meet the additional expenses which this increase would involve.

Decisions of Labor Board

The United States Railway Labor Board handed down three decisions during the last month which concern employes of the maintenance of way department.

Advances to Maintenance of Way Employees

The Labor Board rendered a decision on November 30 with respect to wage disputes affecting employees in the maintenance of way department on seven railroads where there was a failure to arrive at an agreement under Decision No. 1861. This decision, which was dated June 30, 1923, and concerned the controversy between the employees and the railroads with respect to advances in wages, remanded these cases to the parties in dispute on the several railroads in the belief that settlements could be reached through amicable adjustments. These conferences failed of agreement on seven railroads, and the question was again referred to the board for decision, the railroads involved being the Boston & Maine; the Ft. Smith & Western; the Louisville & Nashville; the Louisville, Henderson St. Louis; the Nashville, Chattanooga & St. Louis; the San Antonio, Uvalde & Gulf, and the Trinity & Brazos Valley.

Advances granted by the board are as follows:

On the Boston Maine, crossing watchmen were awarded an advance of two cents an hour.

On the Ft. Smith & Western, track laborers were awarded an advance of one cent an hour.

On the San Antonio, Uvalde & Gulf all of the above-named & St. Louis and the Nashville, Chattanooga & St. Louis, all foremen, assistant foremen and mechanics in the maintenance of way department were awarded an advance of two cents an hour. All mechanics' helpers, track laborers, drawbridge tenders, etc., pile driver, ditching and hoisting firemen ,pumping engineers, etc., were awarded an advance of one cent an hour.

On the San Antonio, Uvalde & Gulf all of the above-named classes were awarded an advance of one cent an hour, with the exception of mechanics in the maintenance of way and bridge and building departments, who were given an advance of two cents an hour. (Decision No. 2049.)

Erie Violates Decision of Board

Under date of December 11, 1923, the United States Railroad Labor Board issued a decision with respect to the violation of its previous Decision No. 1218 by the Erie. In the earlier decision, rendered on September 8, 1922, which concerned the right of the railroad to contract work, the board held that the various contracts entered into by the railroad with the Owen Construction and Repair Company, the Lincoln Engineering Company and the Wagner Construction and Repair Company for the performance of certain work hitherto performed by employees, were in violation of the Trancportation Act. On January 5, 1923, the Labor Board protested against the failure of the railroad to comply with the provisions of the decision. The railroad contended that this decision was outside the jurisdiction of the board, and in a subsequent hearing, a representative of the railroad stated that no action had been taken to comply with the decision. The decision of the board is that the railroad knowingly and willingly persisted in such violation in contempt of the opinion expressed by the board and in contravention of public welfare. (Decision No. 2054.)

Punitive Pay for Tenth Hour When Required to Work the Meal Period

A section gang on the Chicago & North Western was called to work at 4:10 a. m. and worked continuously, with the exception of time taken out to eat lunch, until 5:45 p. m. They were allowed compensation for this service as follows:

4:10 a. m. to 7 a. m.—2 hours and 50 minutes at punitive rate.
7 a. m. to 5:45 p. m.—10 hour and 45 minutes at pro-rata rate.

A claim was made for compensation on the following basis:

4:10 a. m. to 7 a. m.—2 hour and 50 minutes at punitive rate.
7 a. m. to 5 p. m.—10 hours at pro-rata rate.
5 p. m. to 5:45 p. m.—45 minutes at punitive rate.

The position of the railway was that as the regular work period for this crew terminated at 4 p. m. when working on an eight-hour day, they worked only 1 hr. and 45 min. in excess of and continuous therewith and were not entitled to punitive rates for services performed from 5 p. m. to 5:45 p. m. for the reason that this time constituted a part of the tenth hour of service continuous with the regular work period. The opinion of the board is that:

"Time and one-half starts at the expiration of the tenth continuous hour on duty, computed from the employee's regular starting time; where this continuous service includes meal period, no deduction shall be made therefore and the employee will, at the first opportunity, be allowed 20 min. in which to eat. It is not believed it would be just or equitable to write into a rule an interpretation that would practically permit the employer to work the employee 11 hours continuous with and from his regular starting time, for which service the employee would receive the pro-rata rate. (Decision No. 2056.)

Personal Mention

General

W. C. Hayes, division engineer on the Missouri Pacific, with headquarters at Monroe, La., has been promoted to trainmaster, effective December 11.

William J. Backes, engineer maintenance of way of the New York, New Haven & Hartford, with headquarters at Hartford, Conn., has been promoted to assistant general manager, with headquarters at New Haven, Conn. Mr. Backes was born on April 29, 1879, at Hartford, Conn., and was graduated from Sheffield Scientific School in 1899. He entered railway service in July, 1899, as a rodman on the Mexican International. Leaving this road in September, 1900, he was employed as an assistant foreman in the service of the American Dry-Kiln Company, Mexico, until December, following which he became an assistant on the engineering corps on the Pennsylvania Lines, West. He was promoted to transitman in July, 1902, and continued in this capacity until July, 1903, when he entered the service of the New York, New Haven & Hartford. He was transitman on this road until April, 1905, when he became an assistant engineer on the New York, Pennsylvania & New Jersey. He was appointed chief engineer of the Central New England in May, 1906, and on March 1, 1913, was promoted to engineer maintenance of way, of this road and the New York, New Haven & Hartford, the position he held at the time of his recent promotion.

Engineering

Joseph B. Strauss, president of the Strauss Bascule Bridge Company, Chicago, has been appointed consulting engineer of the Alaska railroad.

E. R. Lewis, office engineer of the Michigan Central, with headquarters at Detroit, Mich., has been promoted to principal assistant engineer, with the same headquarters, effective January 1.

L. I. Hammond has been appointed division engineer of the Salt Lake division of the Union Pacific, with headquarters at Salt Lake City, Utah, to succeed **H. J. Blake**, acting division engineer, who has been assigned to other duties.

W. T. Main, division engineer on the Chicago & North Western, with headquarters at Eagle Grove, Iowa, has been transferred to Fond du Lac, Wis., to succeed **C. J. Fredericie**, who has been transferred to Escanaba, Mich., as assistant engineer, and the Eagle Grove office has been abolished.

C. A. Hewes, assistant engineer on the Kansas City Terminal division of the Missouri Pacific, has been appointed assistant engineer in the district engineer's office at Little Rock, Ark., to succeed **V. C. Halpin**, who has been promoted to division engineer at Monroe, La., to succeed **W. P. Hayes**, who has been promoted to trainmaster.

R. E. Cahill, superintendent of the Northern Kansas division of the Missouri Pacific, with headquarters at Atchison, Kans., has been appointed division engineer of the Northern Kansas division succeeding **J. F. Bassett**, who has been appointed assistant division engineer of the Central Kansas and Colorado division, with headquarters at Hoisington, Kans.

C. D. Johnson, whose promotion to division engineer of the Denver & Rio Grande Western, with headquarters at Alamosa, Colo., was announced in the December issue, was born on March 5, 1887, at Milan, Ind., and entered railway service on June 1, 1909, as a rodman on the Denver & Rio Grande Western at Salida, Colo. He left railway service on August 18, 1909, but re-entered it on October 21, 1910, subsequent to which he was engaged as a rodman until October 1, 1912, when he was promoted to draftsman and instrumentman. In December, 1916, he was promoted to assistant engineer and held this position continuously until his recent promotion to division engineer of the Alamosa division.

S. L. Wonson, bridge engineer of the Missouri Pacific, with headquarters at St. Louis, Mo., has been promoted to assistant chief engineer, with the same headquarters, following the death of **H. R. Carpenter**, as reported in the issue of December, 1923. Mr. Wonson was born on July 1, 1877, at Gloucester, Mass., and was graduated from Harvard college in 1899 and from Massachusetts Institute of Technology in 1901. He entered railway service in August, 1910, as a general bridge inspector on the Missouri Pacific, and continued as general bridge inspector until 1912, when he was promoted to assistant bridge engineer, a position he held until October 1, 1913, when he was promoted to bridge engineer.

J. H. Cooper, whose promotion to division engineer of the Philadelphia division of the Pennsylvania, with headquarters at Harrisburg, Pa., was announced in the issue of December, 1923, was born on July 5, 1883, at Easton, Pa., and was graduated from Lafayette college in 1905. He entered railway service on October 13, 1905, as a rodman on the Pennsylvania at Sunbury, Pa. He was promoted to transitman, with headquarters at Philadelphia, Pa., on August 1, 1910, became assistant supervisor on January 1, 1911, and thereafter served as assistant supervisor successively at Tyrone, Conemaugh and Philadelphia until October 25, 1917, when he was promoted to supervisor, serving first at Trenton, N. J., and subsequently at New York City until his promotion to division engineer at Harrisburg.

Frank Strong, division engineer on the Union Pacific, with headquarters at Salt Lake City, Utah, has been promoted to terminal engineer, with headquarters at Los Angeles, Cal. Mr. Strong was born in Philadelphia and graduated from Norwich University, Vermont, in 1902, immediately following which he entered the service of the Pennsylvania, where he was engaged on tunnel and terminal work in New York until 1909. He entered the service of the Los Angeles & Salt Lake (now a part of the Union Pacific) in 1910, subsequent to which he was engaged on location, construction and valuation work until 1916, when he was appointed division engineer of the Salt Lake division. In addition to the service mentioned, Mr. Strong spent one year locating an electric line between Salt Lake and Provo and during the World War served with the army as a first lieutenant.

E. O. Wood, whose promotion to division engineer on the Pennsylvania, with headquarters at Buffalo, N. Y., was announced in the December issue, was born on July 31, 1878, at Bordentown, N. J., and graduated from Rutgers College in 1898. He entered railway service in January, 1900, as a rodman on the West Jersey & Seashore, a subsidiary of the Pennsylvania, and continued in this capacity until July, 1905, when he yas promoted to assistant supervisor, serving successively at Blairsville, Pa., Lancaster and Harrisburg until November, 1909, when he was promoted to supervisor, with headquarters at Sunbury, Pa. He was transferred to Trenton, N. J., in June, 1913, to Millersburg, Pa., in September, 1918, and to Johnstown, Pa., in December, 1922, being promoted on the latter date to assistant division engineer of the Pittsburgh division, with headquarters at Pittsburgh. He was holding this position at the time of his recent promotion to division engineer.

R. L. Pearson, engineer maintenance of way of the New York, New Haven & Hartford, lines west, has been promoted to engineer, maintenance of way, of the system, with headquarters at New Haven, Conn., succeeding **W. J. Backes**, promoted. Mr. Pearson was born on April 2, 1882, and was graduated from Swarthmore College in 1902. In 1904 he became an inspector in the maintenance of way department of the New York, New Haven & Hartford and a few months thereafter was promoted to transitman. In 1908 he was promoted to assistant engineer and in 1914 to track supervisor. In 1916 he was appointed division engineer of the New London division and the following year was transferred to the Providence division. He resigned from the service in October, 1917, and returned in September, 1918, as division engineer of the Central New England and Dan-

bury divisions. In 1920 he was transferred to the New Haven division and in 1921 was promoted to maintenance engineer, lines west, which position he held at the time of his recent promotion.

John W. Keenan, assistant trainmaster and supervisor of the Pittsburgh division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been promoted to assistant division engineer on the same division, with the same headquarters. Mr. Keenan graduated from Pennsylvania State College in 1898 and entered railway service in July, of that year, in the engineering department of the Illinois Central. He left that road in 1900 to enter the service of the Pennsylvania as a rodman, which position he held until January 1, 1903, when he was promoted to supervisor on the Elmira division. He was transferred to the Allegheny division on January 14, 1907, and to the Pittsburgh division on July 1, 1909, where he remained until November 1, 1912, when he was promoted to supervisor on the Cumberland Valley. He returned to the Pennsylvania as supervisor on the Williamsport division on May 1, 1915, and was transferred to the Middle division on February 6, 1917, where he remained until September 16, 1918, when he was transferred to the Pittsburgh division as assistant road foreman of engines. He was promoted to assistant trainmaster on the same division on March 1, 1920, was appointed to serve in the dual capacity of assistant trainmaster and supervisor on January 16, 1921, and continued in this capacity until his recent appointment as assistant division engineer.

W. C. Mock, who has been appointed valuation engineer of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore., entered railway service in July, 1900, as a rodman on location and construction with the Northern Pacific. In September, 1902, he was promoted to assistant engineer in the maintenance of way department and in February, 1903, was appointed transitman on location. He was promoted to chief draftsman in the division engineer's office in April, 1904, and in June, 1906, was appointed chief draftsman and office assistant to the principal assistant engineer in charge of construction of the Northern Pacific and the Spokane, Portland & Seattle. Mr. Mock was promoted to resident engineer on the Spokane, Portland & Seattle in March, 1909, which position he held until February, 1914, when he was appointed field engineer in charge of dock construction for the Commission of Public Docks at Portland, Ore. In 1916, he was appointed assistant to the valuation engineer of the Oregon-Washington Railroad & Navigation Company and he continued in this capacity until his recent promotion to valuation engineer, succeeding **F. C. Squire,** who was appointed engineer, western group, of the Presidents' Conference Committee on Valuation, with headquarters at Chicago.

W. P. Wiltsee, acting chief engineer of the Norfolk & Western, with headquarters at Roanoke, Va., has been appointed chief engineer, with the same headquarters. **F. P.** Turner, acting principal assistant engineer, with headquarters at Roanoke, has been appointed principal assistant engineer and **L. L. Kelly,** acting bridge engineer, has been appointed bridge engineer. Mr. Wiltsee was born on May 30, 1878, at Cincinnati, Ohio, and entered railway service in 1895 as a rodman for **N. D. Burke,** consulting engineer at Cincinnati, and was engaged alternately in municipal and railroad work until 1899. During the following year he served as draftsman and instrumentman for the United States government on river and harbor work and in 1900 was appointed sales engineer on construction and maintenance on the Cincinnati, neer on construction and maintenance on the Cincinnati, Portsmouth & Virginia. He entered the service of the Norfolk & Western in 1901 as a draftsman in the office of the engineer maintenance of way and in 1902 was promoted to chief draftsman in the office of the engineer of construction. From 1903 to 1912 he served as assistant engineer on branch line development in the coal fields, and in the latter year was placed in charge of tidewater improvements at Norfolk and also on other work on the eastern end of the road. He was appointed assistant engineer in the office of the chief engineer in 1916, and held this position until February, 1923, when he was promoted to acting chief engineer, the position he held at the time of his recent promotion. Mr. Wiltsee is a past president of the Roadmasters' and Maintenance of Way Association and a director of the A. R. E. A.

Track

S. H. Brenaman, assistant on the engineer corps of the Northwestern region of the Pennsylvania system, has been promoted to track supervisor on the Toledo division.

P. J. Armstrong has been promoted to roadmaster of the Newport and Oxford subdivisions of the Quebec district of the Canadian Pacific, with headquarters at Farnham, Que., effective December 17, to succeed **K. O. Sheppard,** who was transferred.

J. A. Skehan and **J. M. Boone** have been promoted to the newly created positions of track supervisor on the Mississippi Central, with headquarters at Hattiesburg, Miss., and Brookhaven, respectively.

A. H. Smyth has been promoted to roadmaster of the Idaho division of the Northern Pacific, with headquarters at Kootenai, Idaho, to succeed **John Christenson,** who has retired on account of sickness after 35 years of service in the track department.

C. H. Craig, section foreman on the Chicago, Burlington & Quincy at Aurora, Neb., has been promoted to roadmaster at Orleans, Neb., to succeed **H. L. Stein,** who has been transferred to Nebraska City as trainmaster-roadmaster, where he succeeds **C. W. Hohaus,** deceased.

John H. Olcott has been promoted to assistant supervisor on the New York division of the Philadelphia & Reading, with headquarters at Philadelphia, to succeed **Joseph T. Sturman,** who has been promoted to supervisor, with the same headquarters, in place of **Herbert M. Snook,** who has been furloughed.

F. W. Schneegas has been promoted to roadmaster of the Orland district of the Sacramento division of the Southern Pacific, with headquarters at Orland, Cal., to succeed **S. Albee,** resigned, and **T. W. Saul** has been promoted to roadmaster of the newly created Colfax district, with headquarters at Colfax, Cal.

M. T. Dearden has been promoted to roadmaster on the Union Pacific, with headquarters at Rawlins, Wyo., to succeed **A. A. Gulley,** resigned; **E. A. Buskirk,** roadmaster at Milford, Utah, has been transferred to Pendleton, Ore., to succeed **F. F. Mallon,** who has been transferred to Seattle, Wash., to succeed **E. Wetzel,** resigned.

T. J. Jefferies, whose promotion to supervisor on the Philadelphia & Reading was announced in the issue of December, 1923, was born on April 17, 1886, at West Chester, Pa., and received an engineering education at the University of Pennsylvania, graduating in 1909. He entered railway service in January, 1916, as an employee in the chief engineer's office of the Philadelphia & Reading. He was promoted to assistant supervisor of track, with headquarters at Reading, Pa., in January, 1916, and was transferred to the New York division, with headquarters at Lansdale, Pa., in May, 1920, where he remained until his recent promotion to supervisor at Reading. Pa.

W. C. Pace, supervisor of water supply on the Atlantic Coast Line, has been promoted to roadmaster, with headquarters at Live Oak, Fla., effective December 21, 1923. Mr. Pace was born on August 18, 1886, at Buchanan, Ga., and entered railway service on November 27, 1905, as a track laborer on the Atlantic Coast Line following his graduation from high school, since which time he served in various capacities, including that of pumper, hoisting engineer and pump inspector, until December 1, 1923, when he became supervisor of water supply on the Second division. He was holding this position at the time of his recent promotion to roadmaster, in which capacity he will have jurisdiction over the territory from Dupont, Ga., to High Springs, Fla., including the Lake City branch.

J. M. Fox, whose promotion to supervisor on the Pennsylvania, with headquarters at Barnesboro, Pa., was announced in the issue of December, 1923, was born on March 2, 1892, at Torresdale, Pa., and was graduated from Prince-

ton University in 1905, immediately following which he entered railway service as a chainman on the Baltimore division of the Pennsylvania. He became a rodman on the Baltimore division on May 16, 1916, and was transferred to the Southern division on July 18, 1917. On August 23, 1917, he entered military service, where he served principally as a balloon observer with the French and American armies, until the close of the war. During his absence with the army he was consecutively promoted to transitman and assistant supervisor, and on his return from military service on May 1, 1919, became assistant supervisor on the Tyrone division, being transferred later to the Atlantic and Camden Terminal divisions and on June, 1922, to the Baltimore division at Baltimore.

William O'Brien, assistant track supervisor on the Pere Marquette, with headquarters at Toledo, Ohio, has been promoted to track supervisor in charge of the territory between Toledo, Ohio, and Holly, Mich. Mr. O'Brien was born on January 19, 1879, at Alderson, W. Va., and entered railway service in 1890 as a water boy on the Huntington division of the Chesapeake & Ohio. He was promoted to assistant section foreman in March, 1892, and to section foreman in 1893, with headquarters at Hot Springs, Va. In 1903 he was promoted to extra gang foreman on the Cincinnati division at Caintown, Ky., and in 1906 became foreman of the yards at Covington, Ky. In 1910 he left the Chesapeake & Ohio to become assistant roadmaster on a subsidiary of the Baltimore & Ohio and held this position until 1922, when he left railway service, thereafter being employed by the city of Toledo, Ohio, until 1923, when he re-entered railway service as assistant supervisor on the Pere Marquette.

B. E. Nelson has been promoted to supervisor of track on the New York Central, lines west, with headquarters at Elkhart, Ind., to succeed **J. B. Martin,** who has been promoted to the newly created position of general inspector of track, with headquarters at Cleveland, Ohio, effective January 1. Mr. Martin entered railway service in 1897, as an employee with the Lake Shore & Michigan Southern, now the New York Central Western Lines, and from 1897 to 1905 was employed consecutively in clerical capacities, in the engineering department, on special construction and as assistant roadmaster at different points on the Lake Shore & Michigan Southern until 1905, when he became roadmaster on the Monroe division of the New York Central. Since that time Mr. Martin has served successively as roadmaster and supervisor on the Monroe, Lansing, D. A. V. & P., Alliance, Old Road and Elkhart divisions, until his recent promotion to general inspector of track. Mr. Martin is the author of a number of articles on maintenance of track, among which is the article published in *Railway Engineering and Maintenance* of September, 1923, which won first prize in the contest on the "Ways in Which the Maintenance Department Can Assist in Handling the Peak Load Traffic." He is the first president of the Maintenance of Way Club of Chicago, organized in 1921, and is now president of the Roadmasters' and Maintenance of Way Association.

J. B. Martin

Axel F. Munson, track foreman on the Buffalo division of the Pennsylvania, has been promoted to assistant supervisor of track on the same division, with headquarters at Olean, N. Y.; **R. L. Chaney,** track foreman on the Panhandle division, has been promoted to supervisor of track on the same division, with headquarters at Carnegie, Pa., to succeed **H. R. Geib,** who has been transferred to Sub-division No. 1 of the same division, with headquarters at Carnegie. **Mr. Chaney** was born on July 2, 1894, in Newcomerstown, Ohio, and entered railway service in 1911 as an extra gang laborer on the Panhandle division of the Pennsylvania. After working in this capacity during the summers of 1911 and 1912, he entered railroad work permanently on June 3, 1913, as an assistant in the engineering corps of the Pennsylvania. On February 1, 1915, he was assigned to the work of testing track appliances and on January 20, 1919, was assigned to other special work, which he pursued until October 20, 1921, when he was appointed extra gang foreman. He was promoted to acting supervisor on August 1, 1923, and was serving in this capacity at the time of his recent promotion to permanent supervisor of Sub-division No. 6 at Carnegie, Pa.

Bridge and Building

F. E. Bates, assistant bridge engineer of the Missouri Pacific, with headquarters at St. Louis, Mo., has been promoted to bridge engineer, with the same headquarters, succeeding **S. L. Wonson,** who has been promoted to assistant chief engineer, following the death of **H. R. Carpenter,** whose death was reported in the December issue of 1923.

R. R. Bishop has been promoted to assistant supervisor of bridges and buildings on the Los Angeles & Salt Lake (Union Pacific) to succeed **George M. Haley,** who has been assigned to other work. **C. L. Dunkan** has been promoted to supervisor of bridges and buildings, with headquarters at Los Angeles, Cal., to succeed F. M. Bigelow, who has been assigned to other duties. **J. M. Anderson** has been appointed general water service foreman of the Salt Lake division with headquarters at Salt Lake City, Utah.

Obituary

James E. Hood, general manager of the Uintah Railway, with headquarters at Mack, Colo., and for a number of years in maintenance of way service, died on December 13.

James Finley, formerly bridge engineer on the Canadian Pacific during its western construction period, who also had charge of the construction of the Canadian Pacific bridge at Lachine, Que., died at Vancouver, B. C., on December 24.

H. H. Johntz, engineer maintenance of way of the Missouri-Kansas-Texas, with headquarters at Dallas, Tex., died in that city on December 20 from acute indigestion. Mr. Johntz was born on December 22, 1885, at Abilene, Kan., and is a graduate of Kansas University. He entered railway service in 1910 as a draftsman on the Missouri, Kansas & Texas, and from that time served consecutively as office engineer, district engineer and engineer maintenance of way until February, 1922, when he was appointed district engineer at Parsons, Kan., which position he held until his re-appointment as engineer maintenance of way of the system, upon the re-establishment of this office.

J. T. Wyche, consulting engineer of the Western Pacific, with headquarters at San Francisco, Cal., died in Denver, Colo., on November 27. Mr. Wyche was born in 1859 and graduated from the School of Engineering of the University of the South. He entered railway service in 1884 in the engineering department of the Union Pacific, being engaged subsequently in the construction of several water systems. During the reconstruction of the Union Pacific, he supervised the construction of the Sherman and Aspen tunnels and he was later selected to supervise the construction of the Western Pacific. During the period of federal control, he was appointed chief engineer of the corporate interests of the Denver & Rio Grande and the Western Pacific, being appointed consulting engineer for the Western Pacific in March, 1920.

E. F. Vincent, special consulting engineer of the Colorado & Southern, died on December 30, at the age of 60 years. He was born on July 11, 1863, at Maquoketa, Iowa, and graduated from the University of Iowa in 1884. Entering railway service in May, 1886, he was employed as a drafts-

man and field assistant in the engineering department of the Union Pacific until September, 1887, when he resigned to become engineer on the construction of the state capitol building at Denver, Colo. He returned to the railroad in January, 1888, as field assistant and leveler, but again resigned in July of that year to take charge of a party on survey of reservoir sites for the U. S. Geological Survey near Leadville, Colo. From December, 1889, to April, 1900, he then served as principal assistant engineer of the Board of Public Works of Denver. He returned to railway service in September, 1900, as resident engineer on the Fort Worth & Denver City. In February, 1904, he was appointed assistant chief engineer of the Wyoming State Railways (now part of the Chicago & North Western), and in February, 1905, became an assistant engineer on the Missouri Pacific in charge of surveys in Illinois. In November of the following year he was appointed assistant chief engineer of the Colorado & Southern, which position he held until July, 1915, when he was promoted to chief engineer. He continued in this capacity until February, 1919, when he retired from active service and became special consulting engineer.

E. K. Barrett, superintendent of bridges and buildings and water supply of the Florida East Coast, with headquarters at St. Augustine, Fla., and one of the oldest officers of this company, died during the month of November, 1923, after an extended period of ill health. Mr. Barrett was born on Sepember 6, 1869, at Orange, N. J., and entered railway service immediately after completing a high school course in 1885, as a rodman on the Jacksonville & Atlantic. After serving consecutively as rodman, transitman and levelman on this road for 11 months, he left railway service. From 1888 to 1894 he was engaged by George S. Morrison, Chicago, as bridge inspector and engineer, and in 1895 re-entered railway service as a resident engineer on the Florida East Coast. He served as resident engineer at Palatka, Fla., and Palm Beach until 1896, and thereafter as superintendent of construction and inspector on the Commercial, Cable and Queen buildings in New York City until 1897. Following 1897 he was engaged as a shop inspector successively for the Union Bridge Company and the Pencoyd Works until 1902, when he re-entered the service of the Florida East Coast as general foreman. He was supervisor of bridges and buildings from 1906 to July, 1914, when his title was changed to supervisor of bridges and buildings and water supply. In October, 1920, his title was again changed to superintendent of bridges and buildings and water supply, which position he was holding at the time of his death.

Samuel Rockwell, formerly chief engineer and later consulting engineer of the New York Central lines west of Buffalo, who retired in 1918, died at Cleveland, Ohio, on November, 21, at the age of 76 years. Mr. Rockwell was born on February 20, 1847, at Brooklyn, N. Y., and was a graduate of Sheffield Scientific School, Yale University. He entered railway service in 1864 as a flagman in the engineering corps of the Adirondack railway, following which he was successively leveler on the construction of the St. Paul & Pacific, in charge of construction on the St. Paul & Pacific, and locating engineer of the 33 miles of the Green Bay & Lake Pepin, until 1873, when he became resident engineer on the Hoboken tunnel of the Delaware, Lackawana & Western. He left railway service in 1877 and was engaged in contracting, as city engineer and in other engineering capacities until 1885, when he re-entered railway service as engineer on location and construction of the St. Paul, Minneapolis & Manitoba. From 1887 to 1890 he was chief engineer in charge of location and construction of the Eastern Railway of Minnesota and of the Duluth Terminal railway, and in 1890 was engaged in making surveys for the Atlantic & Pacific's extension to California. In 1891 he became division engineer of the Lake Shore & Michigan Southern at Toledo, Ohio. He was promoted to principal assistant engineer in December, 1899, to assistant chief engineer in April, 1904, and to chief engineer on July 15, 1905. In September, 1912, he was appointed consulting engineer, which position he held until 1918, when he retired.

Construction News

The Atchison, Topeka & Santa Fe has awarded a contract to Swanson Brothers, Topeka, Kan., for the construction of a brick lavatory building at Argentine, Kan., reported in the December, 1923, issue.

This company plans the construction early next year of subways for street traffic under its tracks at Ervay and Hardwood streets, Dallas, Tex.

This company will construct at once the four-mile extension from Tonkawa, Okla., to the Three Sands oil fields, reported in the December, 1923, issue. Included in this project is the construction of second track from Ponca City, Okla., to Marland, a distance of 12 miles. This company has been authorized by the California Railroad Commission to construct a branch line from Los Angeles, Cal., to the Los Angeles harbor, a distance of 12 miles. The cost of the extension is estimated at $2,000,000. This company will proceed at once with the construction of second track from Summit, Cal., to Hicks, a distance of 44 miles.

The Baltimore & Ohio has awarded a contract to the Joseph E. Nelson & Sons Company, Chicago, for the construction of buildings and tank foundations and for installing pipes and pumps for water treating plants at North Dayton, Ohio, East Dayton and Sidney. Contracts were awarded to the Chicago Bridge & Iron Works, New York, for furnishing and erecting water softening tanks at the following locations in Ohio: Old River, 217,000 gal.; Twin Creek, 50,000; East Dayton, 118,500; North Dayton, 230,000; Troy, 119,000; Sidney, 160,000; Lima, 216,500; Deshler, 342,000; Tontogany, two, one of 182,500 gal. and another of 89,000 gal.; Rossford, 340,000 gal. A contract has also been awarded to the same company for furnishing and erecting a 100,000-gal. tank on a 110-ft. tower for fire protection at the new Locust Point Terminal, and roadside tanks for locomotive service at Grafton, W. Va., Frederick Junction, Md., and Somerset, Pa.

The Central of Georgia plans the reconstruction of a portion of its car shops at Savannah, Ga., recently destroyed by fire with a loss reported to be $500,000.

The Chesapeake & Ohio plans the construction of four miles of third track from Ashland, Ky., to Russell.

The Chicago, Burlington & Quincy plans the construction of a number of additional team tracks and an automobile receiving station at its freight house at Denver, Colo. This company will also construct a subway under its tracks at Casper, Wyo.

The Chicago Great Western contemplates the construction of a bridge across the Missouri river at Leavenworth, Kan., at an estimated cost of $1,000,000. The bridge will provide for highway and foot traffic.

The Chicago, Indianapolis & Louisville has called for bids for the construction of a freight station at Indianapolis, Ind., and has awarded a contract to the T. S. Leake Construction Company, Chicago, for the construction of an ice house at Hammond, Ind., to cost approximately $25,000.

The Chicago, Rock Island & Pacific plans the construction this year of 13 miles of second track from Volland, Kan., Dwight and four miles of second track from McFarland, Kans., to Alma.

The Detroit & Ironton has applied for authority to construct a new line from Wauseon, Ohio, to Durban, Mich., 43 miles, in order to afford a shorter and better line than that now operated by the Detroit, Toledo & Ironton, which consists partly of trackage rights.

The Erie plans the construction of a freight terminal with freight transfer house, yards and related facilities between Griffith, Ind., and Highlands. This company and the municipal authorities of Paterson, N. J., have entered into an agreement covering the elimination of grade crossings in that city at a cost of upwards of $3,000,000.

The Illinois Central plans the construction of a locomotive shop, roundhouse and oil station at Sioux City, Iowa, to cost approximately $500,000.

The Kansas City Southern will construct a two-story office building at its shops at Pittsburg, Kan., and contemplates the construction of viaducts and other line improvements at Shreveport, La. This company plans the construction of a grain elevator at Port Arthur, Tex., to cost $500,000 with machinery, and has prepared plans for the construction of an addition to its general offices at Texarkana, Ark., to cost approximately $40,000. The addition will be 50 ft. by 60 ft. and three stories in height.

The Louisville & Nashville is reported to be planning the construction of a new passenger station at Hayden, Ala., and of improvements to the passenger station at Sheffield, Ala.

This company plans the construction of second track from Montgomery, Ala., to Catoma, a distance of five miles, at a cost of approximately $250,000.

This company is reported to have awarded contracts to the Brooks Calloway Company, Atlanta, Ga., the Codell Construction Company and the Boxley Brothers Company, of Orange, Va., for the construction of a second track from Fort Estill, Ky., to Conway.

The Malheur Railroad has applied for authority to construct an extension from Burns to Seneca, Ore., 50 miles.

The Muscle Shoals, Birmingham & Pensacola has applied for authority to build an extension from Kimbrough to Jasper, Ala., 150 miles, to connect with the St. Louis-San Francisco.

The Nashville, Chattanooga & St. Louis has awarded a contract to the Roberts & Schaefer Company, Chicago, for the construction of a 250-ton, three-track reinforced concrete coaling station and concrete gravity sand plant at Kingston, Ga.

The New York, Chicago & St. Louis will construct a one-story machine shop at Conneaut, Ohio, at a cost of $40,000.

The Northern Pacific contemplates the construction of a secondary low grade main line from Killdeer, N. D., to Newlon, Mont., a distance of 80 miles, and of second track from Little Falls, Minn., to Philbrook, a distance of 28 miles, according to testimony of Charles Donnelly, president of the road, at a rate hearing in Minneapolis, Minn.

This company has announced a construction program which will entail the expenditure of $57,000,000 during the next three years. Included in the plans of the company is the construction of second track from Eldredge, N. D., to Windsor, nine miles; Laurel, Mont., to Park City, seven miles; Mission, Mont., to Livingston, five miles; Superior, Wis., to Anton, seven miles; Pasco, Wash., to Ainsworth Junction, two miles, and Great Northern Crossing, Mont., to Austin, ten miles. Additional yard tracks are planned on the Yellowstone and the Pasco divisions and in the Glendive, Forsyth and Kootenai yards. New yards will also be constructed at Everett, Wash., St. Paul, Minn., and Jamestown, N. D. Grade separations planned for the next three years will cost $1,550,000. Among the buildings which are planned are storehouses at Duluth, Minn., Staples, Dilworth and Billings, Mont. Car shops will be constructed at St. Paul and Glendive, and power plants will be erected at St. Paul, Brainerd, Minn., Mandan, N. D., and Missoula, Mont. Commissary buildings will be constructed at Staples, Minn., and Laurel, Mont., and a boiler and tank shop will be erected at Livingston, Mont. The estimated cost of new passenger stations and improvements to existing stations is $750,000.

The Pennsylvania will put into operation a large icing plant at Huntingdon, Pa., 33 miles east of Altoona, early next spring. The station will cost approximately $900,000. Two 700-ft. island platforms will be provided at the new station. The new plant will manufacture 225 tons of ice daily, with facilities for storing 4,000 tons.

The Red River Valley contemplates the construction of a line from Grand Forks, N. D., to Fargo, a distance of 28 miles, at an estimated cost of $5,000,000. Among the incorporators of the company are, according to reports, W. H. Graves and C. M. Drew, of Minneapolis, Minn., and R. A. Hamilton, of Milwaukee, Wis.

The St. Louis-Southwestern, jointly with the St. Louis-San Francisco, plans the remodeling and enlarging of the union passenger station at Jonesboro, Ark.

This company plans the erection of fuel oil storage tanks at Camden, Ark., to store oil for the supply of the entire system. Plans which are being considered call for 10 tanks of 55,000 barrel capacity each. The total cost of the project is estimated at $200,000.

The Southern has applied for authority to construct a cut-off line from Bulls Gap to Leadvale, Tenn., 17.12 miles, which will reduce the ruling grade from 1.5 to .6 per cent.

The Southern Pacific has closed bids for the reconstruction of the passenger station and the erection of a building for the express office at Lindsay, Cal.

This company will soon call for bids for the construction of an 80-ft. by 500-ft. locomotive erecting shop with 24 engine pits and a 200-ton and two 15-ton traveling cranes, at Los Angeles, Cal., the entire project to cost $300,000.

This company has awarded contracts to the Utah Construction Company, San Francisco, Cal., for the construction of the third section of the Natron cutoff on the line between Eugene, Ore., and Klamath Falls, and for the construction of three units of second track in the Sierra Nevada Mountains between Truckee, Cal., and Summitt, and is reported to be planning the construction of second track from Burbank, Cal., to Saugus, a distance of 20 miles.

This company has awarded a contract to the Utah Construction Company, San Francisco, Cal., for the construction of tunnels for the new second track in the Sierra Nevada mountains to cost $400,000.

Texas & Pacific, reported in issue of June 23, 1923, as having purchased land on which to construct a second engine terminal at Dallas, Tex., has prepared plans for the construction of an engine shop building, a roundhouse, a car shop and power house. The terminal will be located at Belt Junction, Dallas, and is estimated to cost $350,000.

The Wabash plans the construction of a 20-stall brick roundhouse at St. Thomas, Ont.

Union Pacific contemplates the construction of a cutoff from Fort Collins, Colo., to Laramie, Wyo., a distance of 65 miles, and is now making surveys of the proposed route. This company has already applied for authority to extend a branch line from Fort Collins to a point approximately 18 miles north.

This company has authorized the construction of a 40-ft. by 160-ft., one-story brick storehouse, with a covered platform, 40-ft. by 100-ft. and six platforms around the storehouse, at Grand Island, Neb., to cost approximately $78,000. This company has also authorized the construction of a 23-ft. by 38-ft., two-story freight and passenger depot at Melba, Idaho, and a 24-ft. by 94-ft., one-story freight and passenger depot at Draper, Utah, each to cost approximately $10,000. The construction of a 22-ft. by 54-ft., one-story frame depot at Sloan, Nev., and of a 24-ft. by 72-ft. frame and stucco freight house at Pasadena, Cal., has also been authorized. These buildings will cost $8,000 and $12,000, respectively. An 8-stall extension to the roundhouse at Caliente, Nev., and the installation of a boiler washing plant at that place, to cost approximately $86,000, has also been approved, as has the construction of a 43-ft. by 210-ft. brick extension to the freight station at Los Angeles, Cal., at a cost of $35,500.

Equipment and Supplies

The Atchison, Topeka & Santa Fe has ordered 70,000 tons of rails from the Colorado Fuel & Iron Co., 17,850 tons from the Illinois Steel Company, 10,319 tons from the Inland Steel Company and 4,300 tons from the Bethlehem Steel Corporation. An order for 25,000 tons of track fastenings was divided proportionately among the four companies.

The New York Central issued an inquiry during December for 30,000 tons of tie plates, and 100,000 kegs of spikes and bolts. This company has received bids on 2,500 tons of steel for bridges at various places on its lines.

The Pennsylvania has received bids on 5,000 tons of steel for a bridge at Sunbury, Pa.

Supply Trade News

General

The Bucyrus Company, South Milwaukee, Wis. is preparing plans for an addition to its plant at Evansville Ind.

The Crane Company, Chicago, is preparing plans for a one-story factory branch at South Bend, Ind.

The Lehon Company, Chicago, has removed its New York City office from 1 Liberty street to 95 Liberty street. This office is in charge of **F. T. Carpenter.**

The O'Fallon Railroad Supply Company, St. Louis, Mo., has been appointed representative in the southwestern territory for the **Burden Iron Company Railroad and Steamship Division,** St. Louis.

The Blaw-Knox Company, Pittsburgh, Pa., has placed **Charles K. Wehn** in charge of a special department devoted to Blaw-Knox standard steel buildings and structural steel construction in Illinois and adjoining states. Mr. Wehn will have his office in the Peoples Gas building Chicago.

The Little Red Wagon Manufacturing Company, Omaha, Nebr., has purchased the business of Stroud & Company, Omaha, and will continue the manufacture of Stroud elevating graders, dump wagons, road maintainers, scrapers, drags plows and other roadmaking machinery.

The Chicago Pneumatic Tool Company, New York, has appointed the **General Machinery Company,** Spokane, Wash., as its agent in the eastern part of Washington and northern Idaho. This company is preparing plans for a three-story brick and steel factory to cost approximately $50,000, at Cleveland Ohio.

The Truscon Steel Company, Youngstown, Ohio, has authorized the expenditure of $400,000 for the extension of its plant in Youngstown. The new buildings will cover two and one-half acres and will increase the floor space to 16 acres. Work will begin at once and will be finished by May 1. This company will commence at once the construction of the first building of a plant at Portland, Ore.

Personal

Dwight E. Robinson has been appointed manager of railway sales department for **Toch Brothers, Inc.,** 110 East Forty-second street, New York City.

Ralph H. Bogle, sales manager of the Reade Manufacturing Company, Jersey City, N. J., has resigned to organize the **R. H. Bogle Company,** with headquarters in the Harrison building, 15th and Market streets, Philadelphia, Pa., to manufacture, distribute and apply chemical weed killer for railway purposes. Mr. Bogle was born on September 12, 1888 and from 1907 to 1915 held various positions covering such activities as real estate, insurance, advertising, managerial, etc. In the latter year he became employed in the traffic department of the New York Central, remaining in this connection for one year when he entered the service of the Atlas Preservative Company and its successor after reorganization, the Chipman Chemical Engineering Company as a salesman and application superintendent. In 1917 he became associated with the Reade Manufacturing Company in the development of a railroad sales department for chemical weed killer. Prior to this connection, Mr. Bogle developed the spray method for distribution of weed killer which later came into extensive use. The R. H. Bogle Company will concentrate on the railway field.

Ralph H. Bogle

N. P. Farrar has been appointed district manager of **The Pawling & Harnischfeger Company,** Milwaukee, Wis. with headquarters at 605 Stephens-Girard building, Philadelphia, Pa., and 50 Church street, New York City.

D. B. Wright has resigned as railroad representative with Paul Dickinson, Inc., with headquarters in Chicago, to become manager of the railroad sales department of the **B. F. Nelson Manufacturing Company,** Minneapolis, Minn., manufacturers of roofing, insulating and waterproofing materials.

J. R. Sexton, railway sales manager of the **H. H. Robertson Company** with headquarters at Chicago, has also been appointed district manager with the same headquarters, succeeding H. F. Hackedorn, whose death was mentioned in the December issue. Mr. Sexton will continue as manager of railway sales in conjunction with his work as district manager. A sketch and photograph of Mr. Sexton appeared in the issue of June, 1923.

Chas. E. Lee, formerly general superintendent of the Boston & Maine, who has for several years been making special transportation studies and reports for various interests in different sections, has established headquarters at 30 Church street, New York City. Associated with Mr. Lee are **C. H. Garber,** consulting railroad engineer of Omaha, a specialist in valuation, construction and maintenance reports, and **James R. Hendry,** an expert in motor truck transportation.

Trade Publications

Rock Drills.—Among recent bulletins issued by the Sullivan Machinery Company, is bulletin No. 81-B, describing a new line of rotator drills which have been redesigned to secure increased speed, the advantage of the new drills being that by substituting certain parts, the various drilling speeds may be obtained with drills already in the hands of the users.

Paint.—The Eagle-Picher Lead Company, Chicago, has issued a special number of "The Painters Eagle" in observance of the eightieth anniversary of this company, which traces the development of the company from its beginning in 1844 down to the present. The story outlines the early methods of manufacture and the improvements made since that time together with information concerning the executives of the company.

River Bank Protection.—The Woods Brothers Construction Company, Lincoln, Neb., has issued two booklets of 12 and 36 pages, describing its system of current retards for the protection of banks along small streams and large rivers, respectively. These books describe in detail the manner of construction of the current retards built by this company and are elaborately illustrated with photographs showing the manner of placing these retards and the improvements affected.

Locomotive Cranes.—The Brown Hoisting Machinery Company, Cleveland, Ohio, has issued a second edition of its booklet No. 10, entitled "Man Power Multiplied," describing with illustrations this company's No. 2 locomotive crane. The booklet enumerates various details of the crane and devotes considerable space to the uses for which it is adapted. The bulk of the illustrations show the crane in actual use on various kinds of work while the remainder of the illustrations, including a number of line drawings, have reference chiefly to showing the working parts and the dimensions. Full specifications covering the crane are included in the booklet, which comprises 20 pages.

Metal Lath Data.—The Truscon Steel Company, Detroit, Mich., has issued the Truscon Metal Lath Data Book, Railroad Edition, Part 4, which is a complete treatise of the application of metal lath to various purposes. Each use is treated in turn with descriptive matter, specifications and illustrations, special attention being given to detailed drawings showing just how the material is applied on the various types of construction. Considerable space is also devoted to descriptions and tables of the properties of the various Truscon products, such as Hy-Rib metal lath, corner bead, hollow steel studding, floretyle, etc.

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Every Tie is a Standard Specification Tie

THE International Organization has proved its willingness to stand back of its products by adopting the policy of branding every tie that leaves its plants with a copper, monogramed dating nail (*see dating nail below*) bearing an imprint, in plain figures, of the year the tie was treated. This policy is of particular value to the tie buyer at times when the demand for ties is greater than the supply and the tendency is to let down on the requirements. It protects the tie buyer and assures high grade standard ties at all times.

International ties are quality ties. They are not only correct in size, but they are produced by uniformly systematic methods which guarantee mechanical soundness and treatment in accordance with the best practices of the day.

The dating nail is our guarantee of quality and your protection against inferior ties.

International Service is one of grade, quality integrity and promptness—a service which cannot be surpassed.

Take advantage of this unusual opportunity.

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INTERNATIONAL PRODUCTS also include

Creosoted Poles
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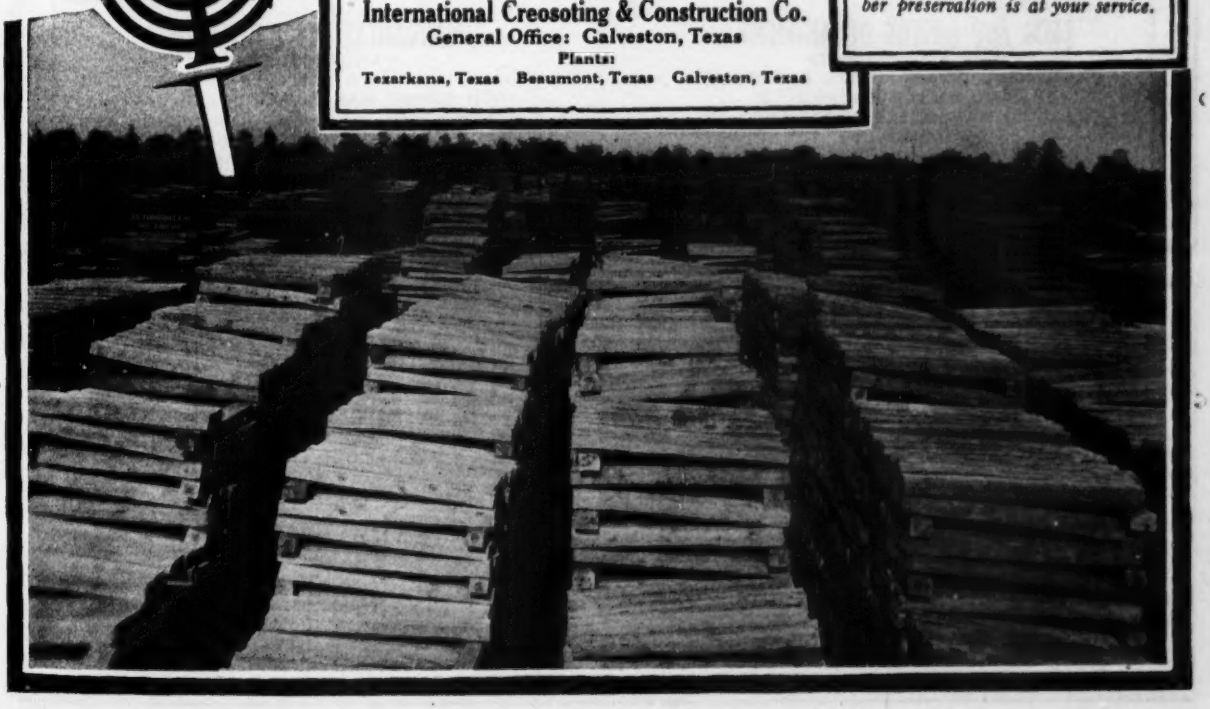
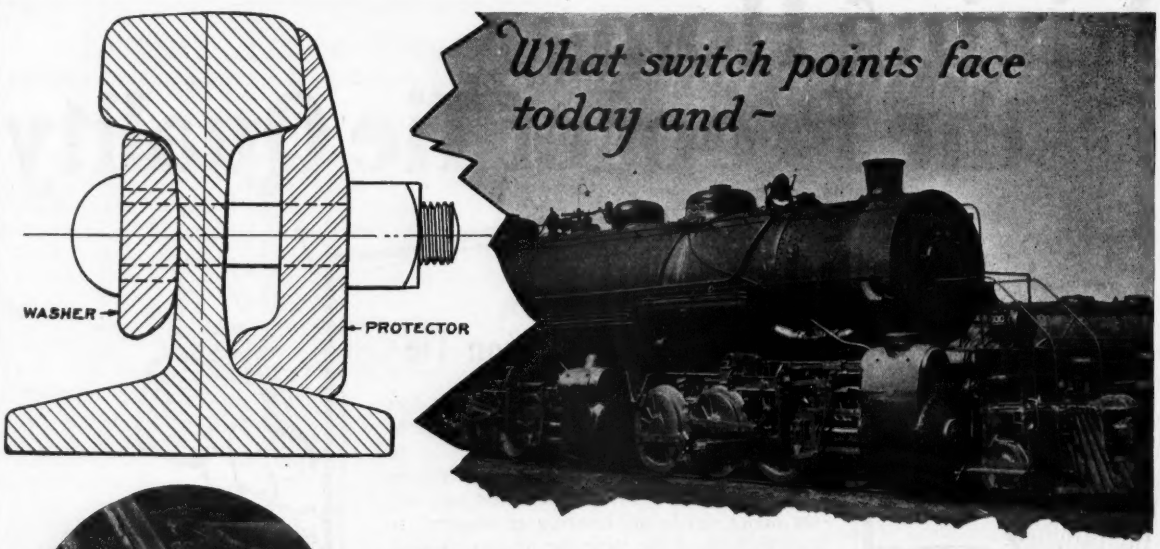
A half century of experience in timber preservation is at your service.





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Protecting switch points with the Mack Protector adds no less than ten times to the life of the unprotected point, it also eliminates the possibility of derailment at switches.

Installation can be made easily at small cost—replacements are made in from five to ten minutes by one man—their efficiency is not impaired by any weather conditions—sure—economical—inexpensive. Write for further information.

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The Frog, Switch & Manufacturing Company

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MANUFACTURERS OF
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Track Work of Rail and Manganese Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings

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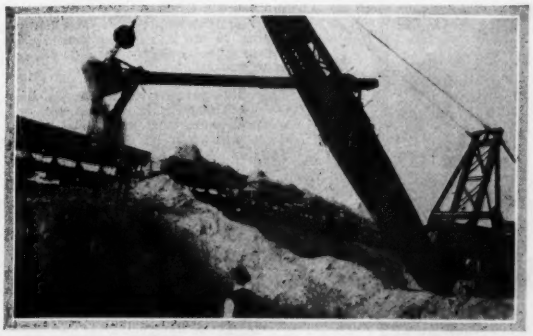
They All Use "*Western*" Dump Cars



Grading the Markham Yards. No matter what the job, Western dump cars do the hauling.

When, on practically every railroad job in the country, Western air dump cars are doing the hauling there must be some good reason for it. It is *good business*, that's all.

Western dump cars will do more work and cost less for operation and maintenance than other dump cars. In selecting your dump car equipment, do not rely on blue prints alone. Investigate the service records of the cars under consideration. You will find that Western dump cars will OUTWORK and OUTLAST any other dump cars on the market.

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Manufacturers of

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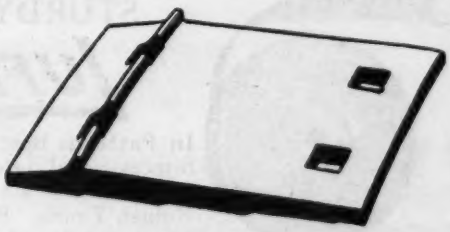
Manganese Track Work a Specialty

Balkwill Cast Manganese Articulated Crossings

Graham Flange Frogs

(*The Savers of Maintenance*)



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Requires only one anchor per rail.

Will hold in both directions.

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What does the repairs and maintenance—not the result of ordinary use—cost you?

Avoid this annoyance, trouble and expense by using a

How lateral movement of spout prevents column being knocked down

The open telescopic joint does not waste a drop or water. It banishes the usual winter time troubles. Ice does not collect upon it.

The valve permits the maximum amount of water to flow in the shortest time. There is a minimum of frictional resistance. It shuts the water off quick without water hammer.

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POAGE Style "H" WATER COLUMN with FENNER DROP SPOUT

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The tender has to leave the track to knock this column down.

The flexible spout makes it unnecessary to spot the tender accurately. You save time by quick adjustment.

The five foot up and down range enables the water column to fill a tender of any height.

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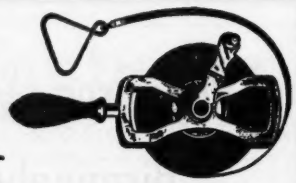

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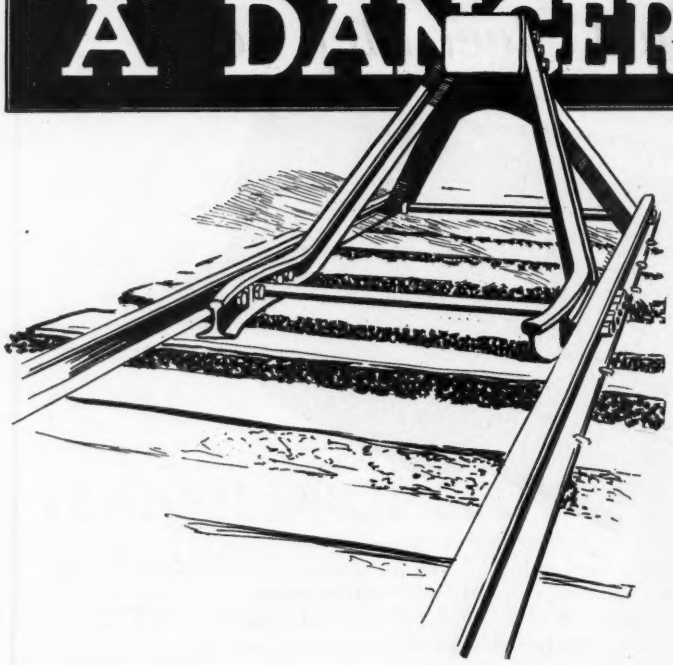

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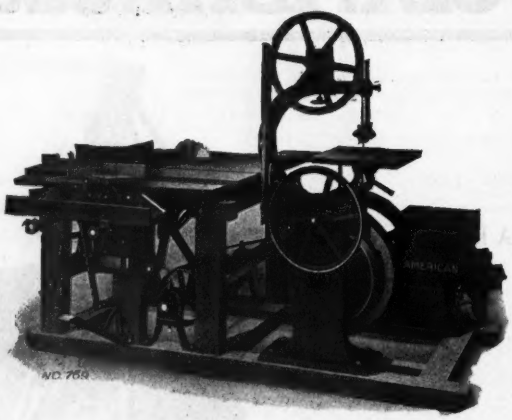

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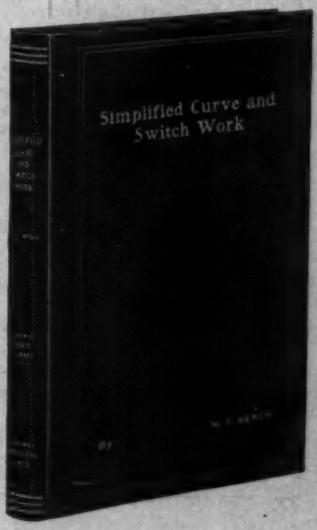

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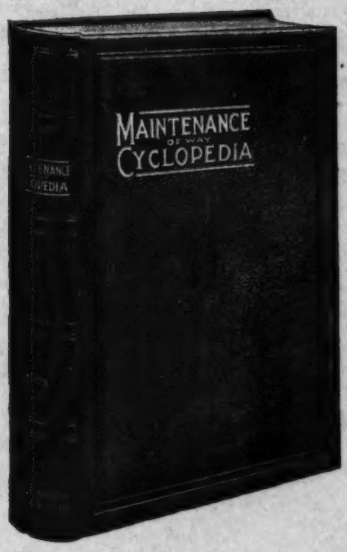

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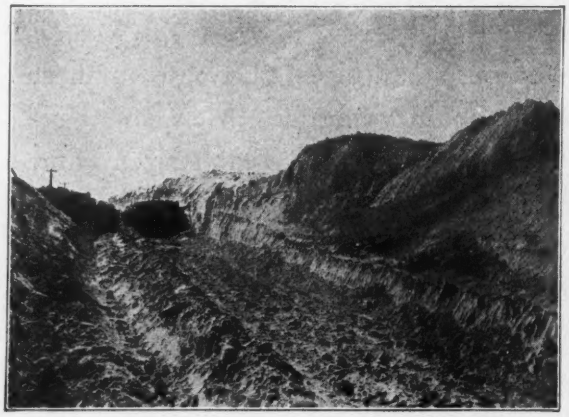

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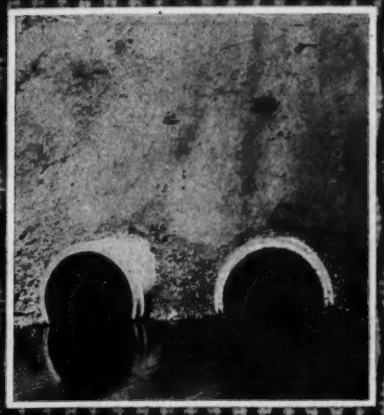

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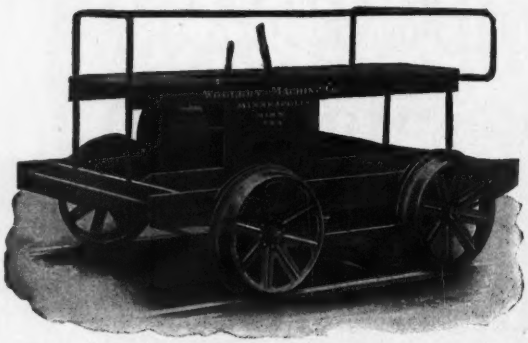

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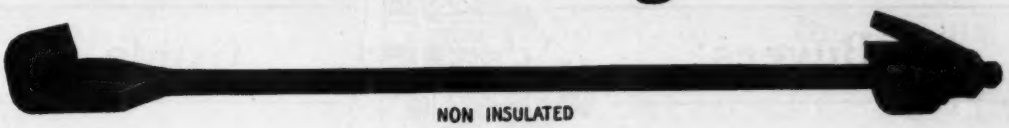

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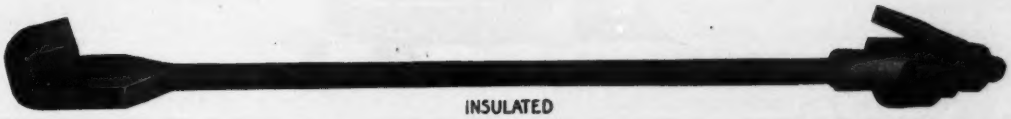

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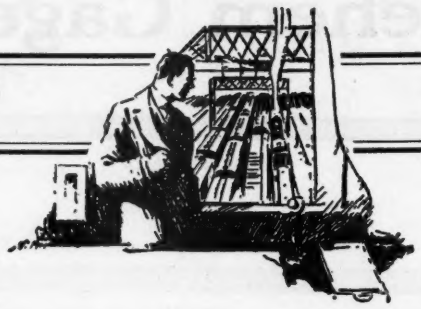

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Over 3,000 Chausse torches are being used at interlocking plants, isolated towers and terminals. They are giving highly satisfactory service in melting snow on switches; thawing frozen engines, trains and pipes; drying car and engine steps. Their great heat, lightness and ease of operation make them popular with maintainers and crews. Specify Chausse on requisitions and get torches standard on over 50 railways. Send for circular.

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Sole Manufacturer Under Chausse Patents

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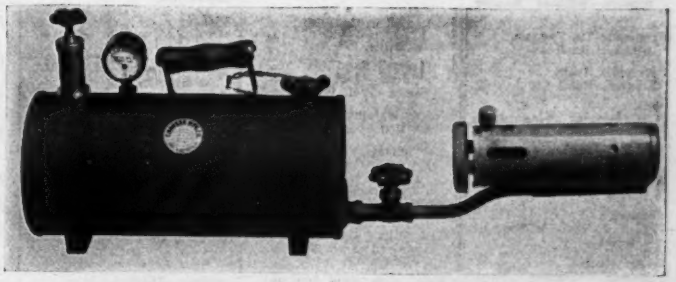

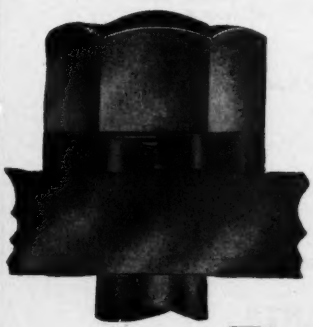

The Positive Lock Washer

works on the ratchet principle and is just as positive in its locking action. Yet it does not injure the nut, the threads or the seat.

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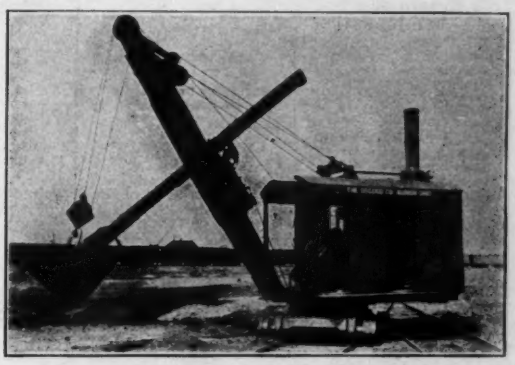

Osgood ¾ Yd. Heavy Duty Railroad Ditcher

START THE NEW YEAR RIGHT

With the coming of the New Year plans will develop for the improvement of your right-of-way. Include an OSGOOD Railroad Ditcher in your plans and secure the greatest results from your efforts.

¾ and 1 cu. yd. sizes that can be mounted on ditcher trucks, standard railroad wheels, continuous treads or traction wheels, and used as ditcher, steam shovel, clamshell, dragline or crane.

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Industrial Works.

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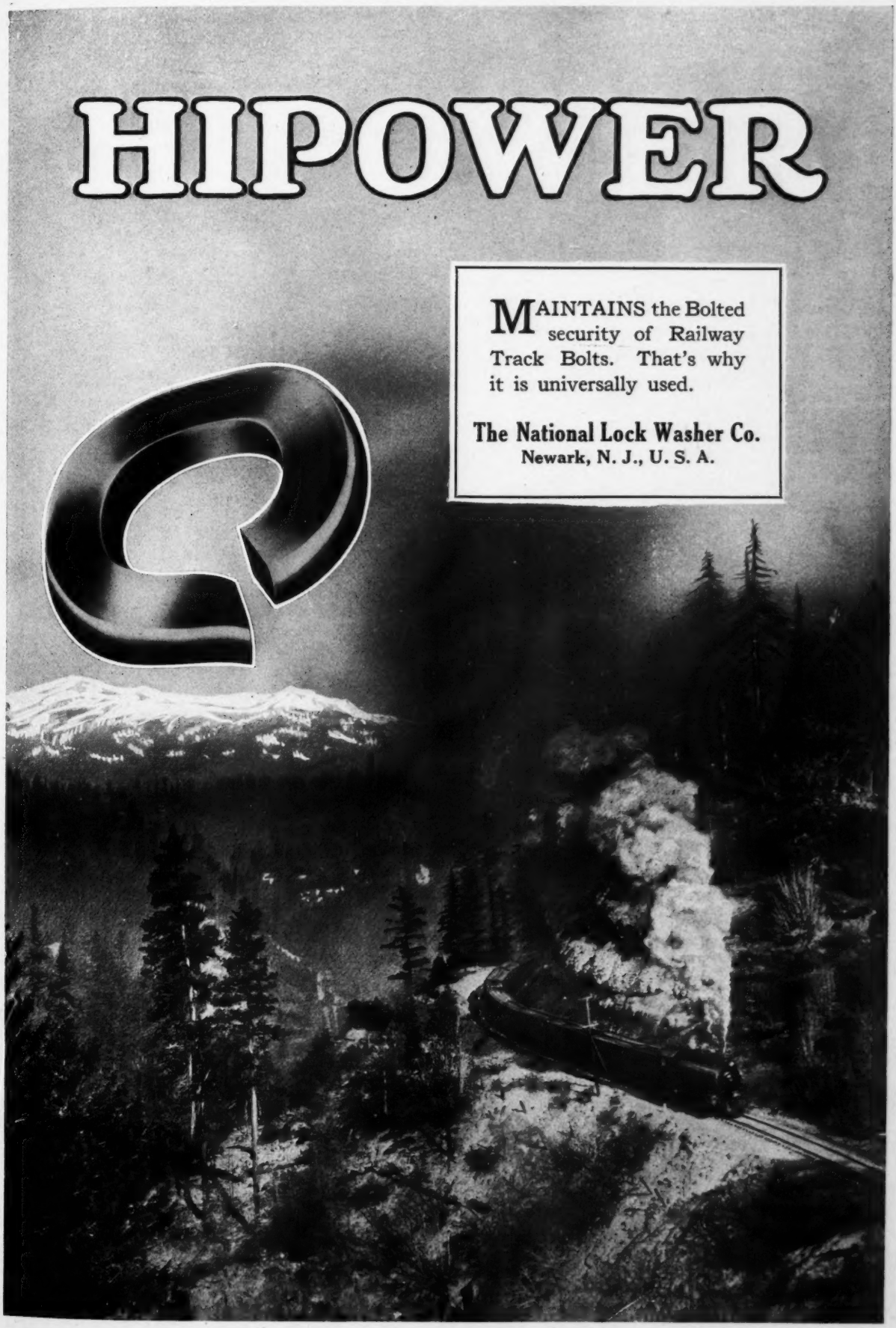
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MAINTAINS the Bolted security of Railway Track Bolts. That's why it is universally used.
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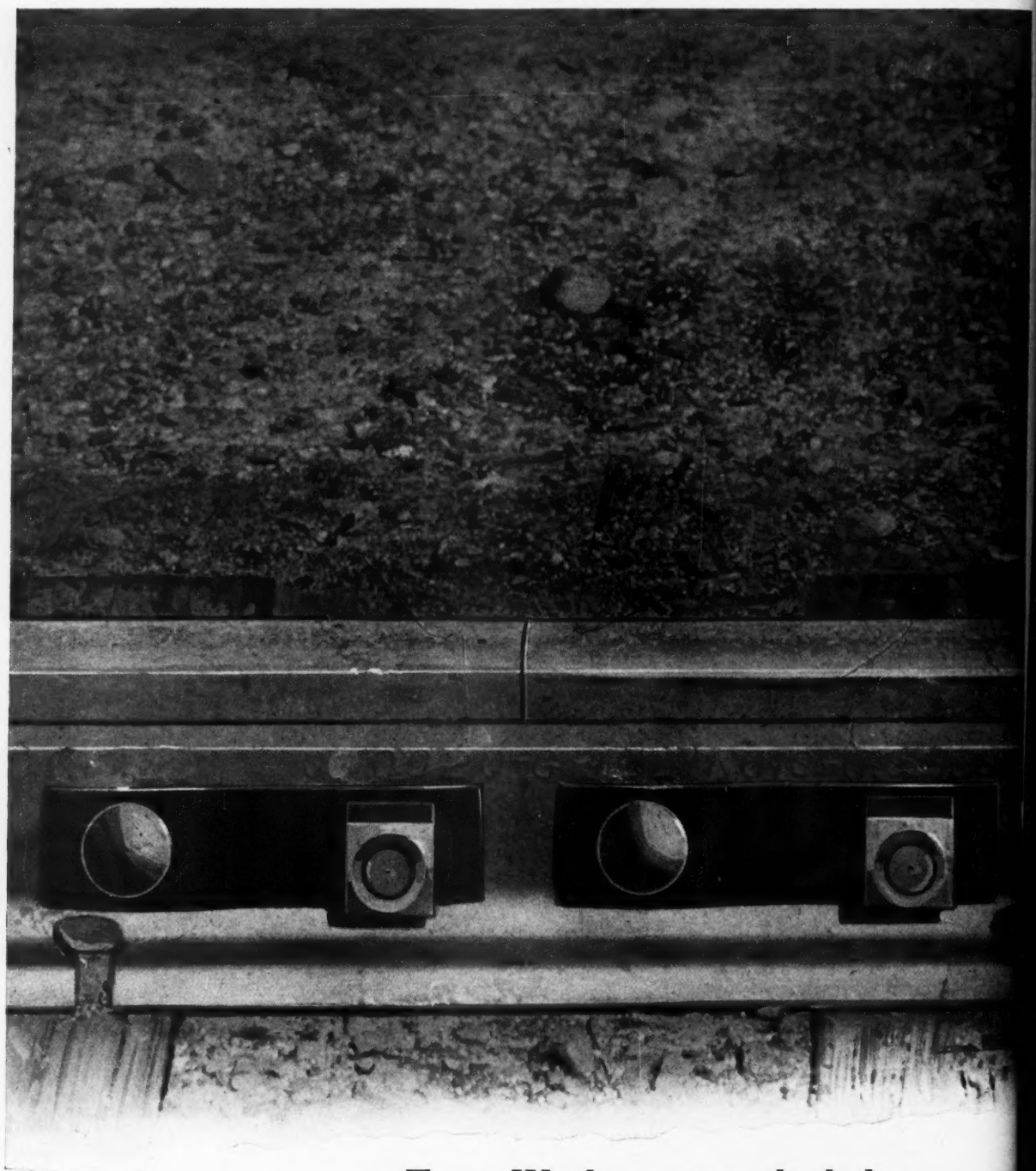

Team Work—among the bolts

With ordinary nut-locks, there is no team-work. Each bolt does its own job but pays no attention to its neighbors. Thus the two bolts nearest the rail ends bear the brunt of all shocks from the rolling load.

With Verona Rail Joint Springs, however, the load is cushioned and distributed. The two bolts that are coupled by a spring give and take one another's burdens and bear the shock jointly. The bolts that are nearest the rail ends bear less than their accustomed load; the others bear more.

This team-work decreases maintenance, and increases the life of bolts, splice bar, and rail ends.

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